ATTACHMENT D. SUMMARY OF POTENTIAL BENEFICIAL AND ADVERSE CALFED EFFECTS AND CONSERVATION MEASURES

Table D-1. Tidal Perennial Aquatic Habitat: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures

Multi-Species Conservation Strategy (MSCS) User Guide: This table lists the types of beneficial and adverse effects on the Natural Community Conservation Plan (NCCP) habitat of implementing all CALFED programs and conservation measures that may be necessary to avoid, minimize, and compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing CALFED actions for a particular summary outcome (see MSCS Table 4-1). Each column lists a summary of effects and conservation measures. Consequently, entries in a column are not related to entries shown in the same row in the other two columns. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in the MSCS technical report "Evaluation Tables and Multi-Species Conservation Strategy Conservation Measures for Natural Community Conservation Plan Communities". This table also lists the evaluated species and Federal Endangered Species Act (FESA) designated critical habitats that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely affected by CALFED actions is presented in MSCS Table 2-2.

Associated Evaluated Species and FESA Designated Critical Habitats Potentially Affected by CALFED: California least tern, western snowy plover, American peregrine falcon, bald eagle, Aleutian Canada goose, California brown pelican, Central California Coast steelhead evolutionarily significant unit (ESU), Central Valley steelhead ESU, Central Valley steelhead ESU critical habitat, delta smelt, delta smelt critical habitat, Sacramento River winter-run chinook salmon ESU, Sacramento River winter-run chinook salmon ESU critical habitat, tidewater goby, Sacramento splittail, Central Valley fall-/late-fall-run chinook salmon ESU, Central Valley spring-run chinook salmon ESU, Central Valley spring-run chinook salmon ESU critical habitat, California gull, long-billed curlew, osprey, Sacramento perch, longfin smelt, green sturgeon, and California freshwater shrimp.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
More natural river flows and Bay-Delta freshwater inflow would improve tidal perennial aquatic habitat through increased organic carbon and other nutrients, improved flushing of contaminants and wastes, and higher seasonal water levels.	Potential for temporary increase in turbidity resulting from construction activities.	Design restorations and use construction methods that would minimize the release of sediment as a direct result of construction activities or subsequent erosion.
Alteration of Delta hydraulic conditions and structural configurations could enhance habitat conditions for evaluated species.	Construction activities associated with actions could result in mortality of evaluated species.	Avoid or minimize construction activities during periods evaluated species are present and could be affected by the actions.
Substantial increase in tidal perennial aquatic habitat area as a result of restoring up to 9,000 acres of shallow-water tidal aquatic habitats and up to 2,000 acres (150–350 miles) of tidal sloughs.	Levee improvements could result in a loss or degradation of existing aquatic habitat.	To the extent consistent with CALFED objectives, design levee improvements to incorporate restoration of shallow aquatic tidal habitat.

Table D-1. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Increase in tidal perennial aquatic habitat area as a result of restoring tidal exchange with leveed or diked lands.	Construction of conveyance facilities and associated infrastructure could result in loss or degradation of habitat.	Restore or enhance 2–5 acres of additional in-kind habitat for every acre of affected habitat near where impacts on habitat are incurred.
Restoration of tidal wetland habitats adjacent to tidal perennial aquatic habitat could increase nutrient inputs to tidal waters and increase habitat values and food web productivity for species associated with the aquatic habitat.		To the extent consistent with achieving CALFED objectives, design conveyance facilities to incorporate restoration of shallow aquatic tidal habitat.
Reducing the adverse effects of dredging and reducing contaminant loadings in Delta waters will improve quality of tidal perennial aquatic habitat.		To the extent consistent with achieving CALFED objectives, design and operate conveyance facilities to avoid entrapping or entraining evaluated species.
Limiting the introduction of non-native species into Delta aquatic habitats will reduce future adverse effects of such reductions, which would help maintain populations of native species associated with Delta aquatic habitats.		
Reducing diversions of freshwater from the Delta would help to maintain existing aquatic habitat values.		
Reducing shoreline erosion would improve aquatic habitat by reducing turbidity and improving the quality of shoreline vegetation.		
Depending on the design of conveyance channels, construction of conveyance channels could result in increasing the area of tidal shallow-water aquatic habitat area.		

Table D-2. Valley Riverine Aquatic Habitat: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures

Multi-Species Conservation Strategy (MSCS) User Guide: This table lists the types of beneficial and adverse effects on the Natural Community Conservation Plan (NCCP) habitat of implementing all CALFED programs and conservation measures that may be necessary to avoid, minimize, and compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing CALFED actions for a particular summary outcome (see MSCS Table 4-1). Each column lists a summary of effects and conservation measures. Consequently, entries in a column are not related to entries shown in the same row in the other two columns. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in the MSCS technical report "Evaluation Tables and Multi-Species Conservation Strategy Conservation Measures for Natural Community Conservation Plan Communities". This table also lists the evaluated species and Federal Endangered Species Act (FESA) designated critical habitats that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely affected by CALFED actions is presented in MSCS Table 2-2.

Associated Evaluated Species and FESA Designated Critical Habitats Potentially Affected by CALFED: Bald eagle, osprey, bank swallow, California red-legged frog, western pond turtle, foothill yellow-legged frog, Central California Coast steelhead evolutionarily significant unit (ESU), Central Valley steelhead ESU, Central Valley steelhead ESU critical habitat, Sacramento River winter-run chinook salmon ESU, Sacramento River winter-run chinook salmon ESU critical habitat, bank swallow, black tern, Sacramento splittail, Central Valley fall-/late-fall-run chinook salmon ESU, Central Valley spring-run chinook salmon ESU, Central Valley spring-run chinook salmon ESU critical habitat, hardhead, Sacramento perch, green sturgeon, and eel-grass pondweed.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Restoration riparian vegetation along up to 235 miles of channels and restoration and enhancement of up to 11,100 acres of floodplain riparian habitat, and protection and enhancement of up to 26,000 acres of stream channel meander corridors, would improve shaded riverine aquatic (SRA) habitat, instream and floodplain habitat, and stream temperature conditions for populations of native riverine aquatic species.	Temporary increase in turbidity resulting from implementing restoration actions.	Avoid or minimize implementing transfers of water from sources that support flows that are beneficial to maintaining populations of native aquatic species.
Reducing diversions from tributaries could improve flow conditions for sustaining populations of native fish, increase survival of native aquatic species during life stages where species are susceptible to being entrained in diversions, and could reestablish floodplain processes associated with flow to more historical conditions.	Degradation of flow conditions for native aquatic species if water is transferred from uses that currently maintain existing flow conditions.	To the extent practicable, augment flows from other sources to maintain existing flow conditions.

Table D-2. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Reduction in contaminant loadings in valley riverine aquatic habitats could improve the survivability of some species and increase invertebrate populations. These invertebrates are prey for some evaluated species and could be adversely affected by toxic agents.	Loss or degradation of existing shaded riverine aquatic overhead cover along channels if construction activities result in removal of riparian vegetation adjacent to channels.	Avoid or minimize disturbance to existing shaded riverine aquatic overhead cover.
Improvement in flow conditions for native aquatic species if water transfers result in augmenting stream flows.	Implementing actions could result in mortality of evaluated species.	Restore or enhance 1–3 times the linear footage of affected shaded riverine aquatic overhead cover near where impacts are incurred.
Improved streamflows would improve flow conditions and stream temperatures for sustaining populations of native aquatic species, and could reestablish floodplain processes associated with flow to more historical conditions.	Permanent loss and fragmentation of valley riverine aquatic habitat and disruption of fish movement patterns if storage facilities and associated infrastructure are constructed in drainages that support valley riverine aquatic habitat.	To the extent practicable, include project design features that allow for onsite reestablishment and long-term maintenance of shaded riverine aquatic overhead cover following project construction.
Improving sediment supplies in streams and rivers could improve spawning conditions for some species and would contribute to restoring floodplain processes.	Permanent loss or degradation of valley riverine aquatic habitat downstream of storage reservoirs if storage operations reduces current patterns of flow.	Avoid or minimize implementing actions during the periods evaluated species are present and could be affected by the actions.
Improved SRA habitat, instream habitat, and stream temperature conditions if increased sediment supplies increases the number and area of point bars and other depositional features along channels that would provide suitable substrates for the natural establishment of riparian vegetation.	Recreational associated disturbance to evaluated species associated with valley riverine aquatic habitats in the vicinity of new or enlarged storage reservoirs.	To the extent practicable, remove or exclude evaluated amphibian and reptile species from construction corridors before construction is initiated.

Table D-2. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Increasing numbers of all life stages of anadromous fish as a result of increasing access to or restoring historical spawning habitats, reducing mortalities to straying, and increasing the number of juveniles successfully passing downstream of barriers.		To the extent consistent with achieving CALFED objectives, avoid constructing storage reservoirs on tributaries that support spawning populations of anadromous fish. Provide sufficient outflow from storage reservoirs to maintain existing aquatic habitat conditions downstream of new storage reservoirs. To the extent consistent with achieving CALFED objectives, design storage facilities to allow passage of anadromous fish to and from spawning habitat located above reservoirs. To the extent practicable, trap and relocate evaluated wildlife species that would be unlikely to escape from the inundation area of new storage reservoirs to suitable nearby habitat areas. Manage recreational uses associated with storage reservoirs to reduce or avoid the likelihood for recreation related impacts on sensitive valley riverine aquatic habitat areas and associated species.

Table D-3. Montane Riverine Aquatic Habitat: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures

Multi-Species Conservation Strategy (MSCS) User Guide: This table lists the types of beneficial and adverse effects on the Natural Community Conservation Plan (NCCP) habitat of implementing all CALFED programs and conservation measures that may be necessary to avoid, minimize, and compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing CALFED actions for a particular summary outcome (see MSCS Table 4-1). Each column lists a summary of effects and conservation measures. Consequently, entries in a column are not related to entries shown in the same row in the other two columns. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in the MSCS technical report "Evaluation Tables and Multi-Species Conservation Strategy Conservation Measures for Natural Community Conservation Plan Communities". This table also lists the evaluated species and Federal Endangered Species Act (FESA) designated critical habitats that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely affected by CALFED actions is presented in MSCS Table 2-2.

Associated Evaluated Species and FESA Designated Critical Habitats Potentially Affected by CALFED: Bald eagle, osprey, California red-legged frog, western pond turtle, foothill yellow-legged frog, Central California Coast steelhead evolutionarily significant unit (ESU), Central Valley steelhead ESU, Central Valley steelhead ESU critical habitat, Sacramento River winter-run chinook salmon ESU, Sacramento River winter-run chinook salmon ESU critical habitat, rough sculpin, McCloud River redband trout, California freshwater shrimp, Central Valley fall-/late-fall-run chinook salmon ESU, Central Valley spring-run chinook salmon ESU, Central Valley spring-run chinook salmon ESU critical habitat, hardhead, and eel-grass pondweed.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Reducing diversions from tributaries could improve flow conditions for sustaining populations of native fish, increase survival of native aquatic species during life stages where species are susceptible to being entrained in diversions, and could reestablish floodplain processes associated with flow to more historical conditions.	Degradation of flow conditions for native aquatic species where water is transferred from uses that currently maintain existing flow conditions.	Avoid implementing transfers of water from sources that support flows that are beneficial to maintaining populations of native aquatic species.
Improvement in flow conditions for native aquatic species if water transfers are used to augment stream flows.	Temporary increase in turbidity resulting from implementing actions necessary to increase sediment supplies.	To the extent practicable, augment flows from other sources to maintain existing flow conditions.
Improved shaded riverine aquatic habitat, instream habitat, and stream temperature conditions for populations of native aquatic species as a result of restoring habitat, improving sediment supply to channels, and improving flows in tributaries.	Implementing actions could result in mortality of evaluated species.	Avoid or minimize implementing actions during the periods evaluated species are present and could be affected by the actions.

Table D-3. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Improved shaded riverine aquatic habitat, instream habitat, and stream temperature conditions where increased sediment increases the number and area of point bars and other depositional features along channels that would provide suitable substrates for the natural establishment of riparian vegetation.	Permanent loss and fragmentation of riverine habitat and disruption of fish movement patterns if storage facilities and associated infrastructure are constructed in drainages that support montane riverine aquatic habitat.	To the extent consistent with achieving CALFED objectives, avoid constructing storage reservoirs on tributaries that support spawning populations of anadromous fish.
Increased numbers of anadromous fish in all life stages as a result of increasing access to or restoring historical spawning habitats, reducing mortalities caused by straying, and increasing the number of juveniles successfully passing downstream of barriers.	Potential for permanent loss or degradation of montane riverine aquatic habitat downstream of storage reservoirs if storage operations reduce current patterns of flow.	Provide sufficient outflow from storage reservoirs to maintain existing aquatic habitat conditions downstream of storage reservoirs.
Reduction in contaminant loadings in montane riverine aquatic habitats could improve the survivability of some species and increase the size of invertebrate populations that are prey for some evaluated species and could be adversely affected by toxic agents.	Recreational associated disturbance to evaluated species associated with montane riverine aquatic habitats in the vicinity of new and enlarged storage reservoirs.	To the extent practicable, design storage facilities to allow passage of anadromous fish to and from spawning habitat located above reservoirs.
		To the extent practicable, trap and relocate evaluated wildlife species that would be unlikely to escape from the inundation area of new storage reservoirs to suitable nearby habitat. Manage recreational uses at new storage reservoirs to reduce or avoid the likelihood for recreation-related impacts on sensitive montane riverine aquatic habitat and its associated species.

Table D-4. Lacustrine Habitat: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures

Multi-Species Conservation Strategy (MSCS) User Guide: This table lists the types of beneficial and adverse effects on the Natural Community Conservation Plan (NCCP) habitat of implementing all CALFED programs and conservation measures that may be necessary to avoid, minimize, and compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing CALFED actions for a particular summary outcome (see MSCS Table 4-1). Each column lists a summary of effects and conservation measures. Consequently, entries in a column are not related to entries shown in the same row in the other two columns. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in the MSCS technical report "Evaluation Tables and Multi-Species Conservation Strategy Conservation Measures for Natural Community Conservation Plan Communities". This table also lists the evaluated species and Federal Endangered Species Act (FESA) designated critical habitats that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely affected by CALFED actions is presented in MSCS Table 2-2.

Associated Evaluated Species and FESA Designated Critical Habitats Potentially Affected by CALFED: American peregrine falcon, bald eagle, Aleutian Canada goose, California gull, osprey, California red-legged frog, California tiger salamander, western pond turtle, Sacramento perch, and eel-grass pondweed.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Increase in lacustrine habitat area as a result of restoring permanent open water areas within restored nontidal marshes.	Loss of lacustrine habitat where lacustrine habitats are restored to tidal, wetland, riparian, or grassland habitat.	Avoid or minimize disturbance to existing high value habitat.
Increase in habitat area where restoration and management of seasonal wetlands results in the establishment of interior patches of permanent open water habitat.	Construction activities or flooding associated with actions could result in mortality of evaluated species.	Avoid or minimize construction activities during the breeding period of evaluated species that are present in existing habitat that could be affected by the actions.
Increase in habitat area where enhancement of wildlife habitat values associated with agricultural lands results in the establishment of permanent open water habitats, such as brood ponds.	Temporary loss or degradation of habitat associated with implementing restoration actions.	Avoid or minimize direct disturbance to populations and individuals of evaluated plant species.
Reduction in the use of herbicides and pesticides in or near existing habitat could improve the vigor of associated plant populations and result in an increase in the size of invertebrate populations. These invertebrates are prey for some evaluated species and could be adversely affected by toxic agents.	Loss of habitat where actions result in dewatering farm ponds or other habitat dependent on agricultural operations.	Establish and protect additional populations of evaluated plant species in suitable nearby habitat before implementing construction activities that could affect existing populations or individuals.

Table D-4. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Refurbishment and maintenance of levees would provide long-term protection of existing habitat from flooding that would result from levee failures. Increase in habitat area where conservation of water for agricultural uses results in the establishment of permanent ponds to capture agricultural tail water. Potential for maintaining or increasing the availability of water for management of existing and restored habitat if water supplies are made available for such uses through water transfers. Increase in lacustrine habitat area associated with new conveyance facilities. Substantial increase in lacustrine habitat area resulting from construction of new or enlarged storage reservoirs. Restoration of up to 1,600 acres of lacustrine habitat adjacent to existing and restored wetlands. Increase in habitat area where actions result in modifying existing channels to create overflow channels and backwaters that maintain permanent water. More natural flows could improve floodplain lacustrine habitat and communities by providing higher, more natural water levels and river flows that would inundate ponds, lakes, and oxbows in river floodplains.	Potential for loss or degradation of existing habitat if water is transferred from uses that currently maintain lacustrine habitat. Construction of new conveyance facilities and supporting infrastructure could result in the loss or degradation of habitat.	Avoid or minimize implementing transfers of water from sources that support high value lacustrine habitats.

Table D-5. Saline Emergent Habitat: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures

Multi-Species Conservation Strategy (MSCS) User Guide: This table lists the types of beneficial and adverse effects on the Natural Community Conservation Plan (NCCP) habitat of implementing all CALFED programs and conservation measures that may be necessary to avoid, minimize, and compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing CALFED actions for a particular summary outcome (see MSCS Table 4-1). Each column lists a summary of effects and conservation measures. Consequently, entries in a column are not related to entries shown in the same row in the other two columns. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in the MSCS technical report "Evaluation Tables and Multi-Species Conservation Strategy Conservation Measures for Natural Community Conservation Plan Communities". This table also lists the evaluated species and Federal Endangered Species Act (FESA) designated critical habitats that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely affected by CALFED actions is presented in MSCS Table 2-2.

Associated Evaluated Species and FESA Designated Critical Habitats Potentially Affected by CALFED: Suisun ornate shrew, San Pablo California vole, Salt marsh harvest mouse, California clapper rail, California black rail, white-tailed kite, American peregrine falcon, Aleutian Canada goose, Central California Coast steelhead evolutionarily significant unit (ESU), Central Valley steelhead ESU, Central Valley steelhead ESU critical habitat, delta smelt, delta smelt critical habitat, Sacramento River winter-run chinook salmon ESU, Sacramento River winter-run chinook salmon ESU critical habitat, tidewater goby, Sacramento splittail, Central Valley fall-/late-fall-run chinook salmon, Central Valley spring-run chinook salmon ESU, Central Valley spring-run chinook salmon ESU critical habitat, saltmarsh common yellowthroat, San Pablo song sparrow, Suisun song sparrow, short-eared owl, California gull, long-billed curlew, northern harrier, Sacramento perch, longfin smelt, green sturgeon, delta tule pea, Mason's lilaeopsis, Suisun Marsh aster, Point Reyes birds-beak, California seablite, soft bird's-beak, Suisun thistle, and Marin knotweed.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Long-term protection of existing tidal saline emergent wetland habitat in the extreme western Delta from the direct adverse effects of dredging, and increases in suitable substrates necessary for the natural reestablishment of saline emergent vegetation as a result of increased sediment deposition in channels.	Temporary or permanent loss or degradation of existing tidal saline emergent wetland habitat along channels where construction activities result in removal of saline emergent vegetation or its supporting hydrology.	Avoid or minimize disturbance to existing saline emergent wetland habitat.
Reduction in the use of herbicides and pesticides near existing tidal saline emergent wetland habitat in the extreme western Delta could improve the vigor of associated plant populations and result in an increase in invertebrate populations. These invertebrates are prey for some evaluated species and could be adversely affected by toxic agents.	Construction activities associated with actions could result in mortality of evaluated species.	Restore or enhance 2–5 acres of additional in-kind habitat for every acre of affected existing saline emergent wetland habitat. This compensation should be implemented before the impact occurs and near the affected location.

Table D-5. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Increase in habitat area where protection, enhancement, or restoration of shallow-water and tidal slough habitats create geomorphic and hydrologic conditions suitable for the establishment and maintenance of tidal emergent vegetation.	Permanent loss or degradation of existing nontidal saline emergent wetland habitat where diked or leveed lands are flooded to restore tidal habitats.	To the extent practicable, include project design features that allow for onsite reestablishment and long-term maintenance of saline emergent wetland vegetation following project construction.
Restoration of 7,500–12,000 acres and enhancement of 6,500 acres of tidal saline emergent wetland habitat.	Permanent loss or degradation of existing nontidal saline emergent wetland habitat as a result of restoring nontidal open water habitat.	Avoid or minimize construction activities during the breeding period of evaluated species that could be affected by the actions.
Increase in habitat area where management of seasonal wetlands results in the establishment of interior patches of nontidal saline wetland habitats.	Short-term disturbance to existing nontidal saline wetlands as a result of improving management of existing seasonal wetlands.	Avoid or minimize direct disturbance to populations and individuals of evaluated plant species.
Long-term protection of existing tidal habitat from boat wake-induced erosion of shoreline and channel island habitat.		Establish and protect additional populations of evaluated plant species in suitable nearby habitat before implementing construction activities that could affect existing populations or individuals. To the extent practicable, trap and relocate evaluated wildlife species that would be unlikely to avoid construction equipment or escape inundation resulting from restoration of suitable nearby habitat. To the extent practicable, before restoring habitat in areas that support emergent vegetation, restore habitat in locations that do not support tidal emergent vegetation. This will ensure there is no net loss of habitat over the period restoration is implemented.

Table D-5. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
		Avoid or minimize restoring nontidal saline emergent habitat with high habitat values to tidal wetlands or other habitat types. Minimize effects of construction-related runoff into nearby wetlands through use of siltation control barriers, detention basins, or other appropriate methods.

Table D-6. Tidal Freshwater Emergent Habitat: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures

Multi-Species Conservation Strategy (MSCS) User Guide: This table lists the types of beneficial and adverse effects on the Natural Community Conservation Plan (NCCP) habitat of implementing all CALFED programs and conservation measures that may be necessary to avoid, minimize, and compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing CALFED actions for a particular summary outcome (see MSCS Table 4-1). Each column lists a summary of effects and conservation measures. Consequently, entries in a column are not related to entries shown in the same row in the other two columns. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in the MSCS technical report "Evaluation Tables and Multi-Species Conservation Strategy Conservation Measures for Natural Community Conservation Plan Communities". This table also lists the evaluated species and Federal Endangered Species Act (FESA) designated critical habitats that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely affected by CALFED actions is presented in MSCS Table 2-2.

Associated Evaluated Species and FESA Designated Critical Habitats Potentially Affected by CALFED: Suisun ornate shrew, Suisun song sparrow, short-eared owl, California gull, northern harrier, white-faced ibis, grasshopper sparrow, long-billed curlew, American peregrine falcon, California black rail, white-tailed kite, black tern, Aleutian Canada goose, giant garter snake, Central California Coast steelhead evolutionarily significant unit (ESU), Central Valley steelhead ESU, Central Valley steelhead ESU critical habitat, delta smelt, delta smelt critical habitat, Sacramento River winter-run chinook salmon ESU, Sacramento River winter-run chinook salmon ESU critical habitat, tidewater goby, Sacramento splittail, Central Valley fall-/late-fall-run chinook salmon, Central Valley spring-run chinook salmon ESU, Sacramento perch, longfin smelt, green sturgeon, delta mudwort, Mason's lilaeopsis, delta tule pea, rose-mallow, and Suisun marsh aster.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Increase in habitat area in some locations where timing and magnitude of augmented flows are sufficient to result in additional flooding at higher elevations than are currently inundated by tides.	Temporary or permanent loss or degradation of existing tidal freshwater emergent wetland habitat along channels where construction activities result in removal of tidal freshwater emergent vegetation or its supporting hydrology.	Avoid or minimize disturbance to existing tidal freshwater emergent wetland habitat.
Increase in tidal freshwater emergent wetland habitat area where modified channels include features (e.g., benches along setback levees) that would allow for the natural reestablishment of tidal freshwater emergent vegetation.	Construction activities associated with actions could result in mortality of evaluated species.	Restore or enhance 2–5 acres of additional in-kind habitat for every acre of affected tidal freshwater emergent wetland habitat. This compensation should be implemented before the impact occurs and near the impact location.

Table D-6. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Increase in habitat area where protection, enhancement, or restoration of shallow-water, channel island, tidal slough, and riparian habitats create geomorphic and hydrologic conditions suitable for the establishment and maintenance of tidal emergent vegetation.	Loss of evaluated plant species where tidal hydrology changes sufficiently to create conditions unsuitable for maintaining populations of evaluated plant species.	To the extent practicable, include project design features that allow for onsite reestablishment and long-term maintenance of tidal freshwater emergent wetland vegetation following project construction.
Restoration of 30,200–45,800 acres of tidal freshwater emergent wetland habitat.	Permanent loss or degradation of tidal freshwater emergent wetland habitat along channels upstream of the new screened intake at Clifton Court Forebay, and operable barriers where operation of new structures adversely affects the hydrology supporting existing tidal freshwater emergent wetland habitat.	Avoid or minimize construction activities during the breeding period of evaluated species that are present in existing habitat and that could be affected by these actions.
Long-term protection of existing tidal freshwater emergent wetland habitat from the direct adverse effects of dredging, and potential increase in suitable substrates necessary for the natural reestablishment of emergent vegetation as a result of increased sediment deposition in channels.	Construction of storage and conveyance facilities and associated infrastructure could result in short-term or permanent loss or degradation of tidal freshwater emergent wetland habitat.	Avoid or minimize direct disturbance to populations and individuals of evaluated plant species.
Reduction in the use of herbicides and pesticides near existing tidal freshwater emergent wetland habitat could improve the vigor of associated plant populations and result in an increase in invertebrate populations. These invertebrates are prey for some evaluated species and could be adversely affected by toxic agents.		Establish and protect additional populations of evaluated plant species in suitable nearby habitat before implementing construction activities that could affect existing populations or individuals.

Table D-6. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Long-term protection of existing habitat from boat wake-induced erosion of shoreline and channel island habitat.		To the extent consistent with achieving CALFED objectives, operate barriers and other instream structures affecting tidal movement in a manner that will not adversely affect the hydrology supporting populations of evaluated plant species. To the extent practicable, before restoring habitat in areas that support emergent vegetation, initially restore habitat in locations that do not support tidal emergent vegetation. This will ensure that there is no net loss of habitat over the period that restoration is implemented. To the extent consistent with achieving CALFED objectives, select Delta islands that support little or no emergent vegetation along adjacent channels for use as storage facilities.

Table D-7. Nontidal Freshwater Permanent Emergent Habitat: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures

Multi-Species Conservation Strategy (MSCS) User Guide: This table lists the types of beneficial and adverse effects on the Natural Community Conservation Plan (NCCP) habitat of implementing all CALFED programs and conservation measures that may be necessary to avoid, minimize, and compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing CALFED actions for a particular summary outcome (see MSCS Table 4-1). Each column lists a summary of effects and conservation measures. Consequently, entries in a column are not related to entries shown in the same row in the other two columns. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in the MSCS technical report "Evaluation Tables and Multi-Species Conservation Strategy Conservation Measures for Natural Community Conservation Plan Communities". This table also lists the evaluated species and Federal Endangered Species Act (FESA) designated critical habitats that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely affected by CALFED actions is presented in MSCS Table 2-2.

Associated Evaluated Species and FESA Designated Critical Habitats Potentially Affected by CALFED: American peregrine falcon, Aleutian Canada goose, California black rail, black tern, white-tailed kite, short-eared owl, California gull, northern harrier, white-faced ibis, tricolored blackbird, long-billed curlew, western least bittern, greater sandhill crane, black-crowned night heron (rookery), and snowy egret (rookery), giant garter snake, California red-legged frog, Sacramento perch, western pond turtle, bristly sedge, hispid bird's-beak, mad-dog skullcap, rose-mallow, Sanford's arrowhead, slough thistle, Calistoga popcorn flower, Kenwood Marsh checkerbloom, Napa blue grass, Pitkin Marsh lily, Sonoma alopecurus, white sedge, North Coast semaphore grass, California beaked-rush, marsh skullcap, Ferris' milk-vetch, four-angled spikerush, marsh checkerbloom, Delta coyote-thistle, Bellinger's meadowfoam, and English peak greenbriar.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Restoration of up to 17,000 acres of nontidal freshwater permanent emergent marsh habitat in the Delta Region.	Permanent loss or degradation of existing habitat as a result of restoring existing nontidal permanent wetlands to other habitat types.	Avoid or minimize disturbance to existing habitat.
Increase in habitat area where restoration and management of seasonal wetlands results in the establishment of interior patches of freshwater permanent wetland habitats.	Construction activities or flooding associated with actions could result in mortality of evaluated species.	Before implementing actions that could result in the loss or degradation of habitat, restore or enhance 1–3 acres of additional in-kind habitat for every acre of existing habitat affected by restoration near where impacts would occur.
Reduction in the use of herbicides and pesticides in or near existing habitat could improve the vigor of associated plant populations and result in an increase in invertebrate populations. These invertebrates are prey for some evaluated species and could be adversely affected by toxic agents.	Temporary loss or degradation of habitat associated with restoration actions.	Avoid or minimize construction activities during the breeding period of evaluated species that could be affected by these actions.

Table D-7. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Levee improvements would result in long-term protection of existing habitat from flooding that would result from levee failures.	Water conservation measures could result in localized loss of relatively small habitat areas where emergent vegetation is currently supported primarily by seeps or runoff associated with existing inefficiencies in the use of agricultural water.	Avoid or minimize direct disturbance to populations and individuals of evaluated plant species.
Increase in the availability of water for management of existing and restored habitat where water supplies are made available for such uses through water transfers.	Loss or degradation of existing emergent wetland habitat where water is transferred from uses that currently support wetland vegetation.	Establish and protect additional populations of evaluated plant species in suitable nearby habitat before implementing construction activities that could affect existing populations or individuals.
Increase in wetland habitat area where design and operation of storage reservoirs provide suitable substrate and hydrology to support the natural establishment and long-term maintenance of emergent vegetation along storage reservoir shorelines.	Construction of storage and conveyance facilities and associated infrastructure could result in temporary or permanent loss or degradation of nontidal freshwater permanent emergent habitat.	Minimize effects of construction-related runoff into nearby wetlands through use of siltation control barriers, detention basins, or other appropriate methods.
Increase in habitat area where increased flows inundate overflow channels, old oxbows, and other floodplain features for sufficient periods to allow for the establishment and maintenance of emergent vegetation.	Loss or degradation of habitat on the landward side of levees where levees are setback to reestablish stream meander corridors and floodplain habitats.	Avoid or minimize implementing transfers of water from sources that support emergent wetland vegetation.
Increase in habitat area where actions result in modifying existing channels to create overflow channels and backwaters that support emergent vegetation.	Permanent loss or degradation of emergent wetlands downstream of storage reservoirs where storage operations adversely affect current channel hydrology supporting existing wetland vegetation.	To the extent practicable, trap and relocate to suitable nearby habitat evaluated wildlife species that would be unlikely to escape from inundation of new or enlarged storage reservoirs.
	Recreational associated disturbance to evaluated species associated with nontidal freshwater permanent emergent habitat in the vicinity of new and enlarged storage reservoirs.	Provide sufficient outflow from storage reservoirs to support the long-term maintenance of wetland vegetation downstream of storage reservoirs.

Table D-7. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
		Manage recreational uses at new storage reservoirs to reduce or avoid the likelihood for recreation-related impacts on sensitive plant populations and wildlife use areas.

Table D-8. Natural Seasonal Wetland Habitat: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures

Multi-Species Conservation Strategy (MSCS) User Guide: This table lists the types of beneficial and adverse effects on the Natural Community Conservation Plan (NCCP) habitat of implementing all CALFED programs and conservation measures that may be necessary to avoid, minimize, and compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing CALFED actions for a particular summary outcome (see MSCS Table 4-1). Each column lists a summary of effects and conservation measures. Consequently, entries in a column are not related to entries shown in the same row in the other two columns. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in the MSCS technical report "Evaluation Tables and Multi-Species Conservation Strategy Conservation Measures for Natural Community Conservation Plan Communities". This table also lists the evaluated species and Federal Endangered Species Act (FESA) designated critical habitats that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely affected by CALFED actions is presented in MSCS Table 2-2.

Associated Evaluated Species and FESA Designated Critical Habitats Potentially Affected by CALFED: American peregrine falcon, greater sandhill crane, white-tailed kite, tricolored blackbird, short-eared owl, Swainson's hawk, California gull, long-billed curlew, northern harrier, giant garter snake, California red-legged frog, California tiger salamander, western spadefoot, Delta green ground beetle, Delta green ground beetle critical habitat, Conservancy fairy shrimp, longhorn fairy shrimp, mid-valley fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, Sonoma alopecurus, North Coast semaphore grass, Ferris' milk-vetch, hispid bird's-beak, mad-dog skullcap, slough thistle, Henderson's bent grass, alkali milk-vetch, heartscale, brittlescale, lesser saltscale, San Joaquin spearscale, vernal pool, smallscale, Sonoma sunshine, Lost Hills crownscale, succulent owl's clover, Hoover's spurge, Palmate-bracted bird's-beak, recurved larkspur, Loch Lomond button-celery, spiny-sepaled button-celery, Boggs Lake hedge-hyssop, Hall's tarplant, Ahart's dwarf rush, Contra Costa goldfields, legenere, San Joaquin woollythreads, Heckard's peppergrass, Butte County meadowfoam, Sebastopol meadowfoam, few-flowered navarretia, many-flowered navarretia, pincushion navarretia, Colusa grass, San Joaquin Valley orcutt grass, Hairy orcutt grass, slender orcutt grass, Sacramento orcutt grass, Ahart's paronychia, Red Hills ragwort, Greene's tuctoria, and Crampton's tuctoria.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Increase in natural seasonal wetland habitat where suitable hydrology develops along margins of restored nontidal permanent freshwater emergent habitat.	Temporary or permanent loss or degradation of existing natural seasonal wetland habitat where construction activities result in removal of seasonal wetland vegetation.	Avoid or minimize disturbance to existing natural seasonal wetland habitat.
Potential for increases in natural seasonal wetland habitat incidental to restoration and enhancement of managed seasonal wetlands.	Construction activities associated with actions could result in mortality of evaluated species.	Restore or enhance 2–5 acres of additional in-kind habitat for every acre of affected natural seasonal wetland habitat. This compensation should be implemented before the impact occurs and near the impact location.

Table D-8. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Restoration of up to 100 acres of vernal pool habitat and long-term protection of existing vernal pool habitats from potential loss or degradation caused by future changes in land use.	Loss or degradation of existing natural seasonal wetlands as a result of implementing aquatic, floodplain, wetland, riparian, and upland habitat enhancements and restorations.	To the extent consistent with achieving CALFED objectives, include project design features that allow for onsite reestablishment and long-term maintenance of natural seasonal wetland vegetation following project construction.
Long-term protection and enhancement of existing natural seasonal wetland habitat where grassland restoration and agricultural land enhancement activities also improve the quality of associated seasonal wetlands.	Localized loss of relatively small seasonal wetland habitat areas where water conservation measures dewater habitat supported primarily by seeps or runoff associated with existing inefficiencies in the use of agricultural water.	Avoid or minimize construction activities during the breeding period of evaluated species that could be affected by these actions.
Reduction in the use of herbicides and pesticides in or near existing seasonal wetland habitat areas could improve the vigor of associated plant populations and result in an increase in invertebrate populations. These invertebrates are prey for some evaluated species and could be adversely affected by toxic agents.	Construction of storage or conveyance facilities and associated infrastructure could result in the permanent loss of natural seasonal wetlands.	Avoid or minimize direct disturbance to populations and individuals of evaluated plant species.
Levee improvements would result in long-term protection of existing habitat from flooding that would result from levee failures.	Potential for recreation-associated disturbance to evaluated species associated with natural seasonal wetland habitats in the vicinity of new and enlarged storage reservoirs.	Establish and protect additional populations of evaluated plant species in suitable nearby natural seasonal wetland habitat before implementing construction activities that could affect existing populations or individuals.
Increase in habitat area where increased flows inundate overflow channels, old oxbows, and other floodplain features for sufficient periods to allow for the establishment and maintenance of seasonal wetland vegetation.		Minimize potential effects of construction-related runoff into nearby wetlands through use of siltation control barriers, detention basins, or other appropriate methods.

Table D-8. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Depending on storage design and operation, potential for the natural establishment and long-term maintenance of seasonal wetland vegetation along storage-pool shorelines.		Manage recreational uses of new storage reservoirs to reduce or avoid the likelihood for recreation-related impacts on sensitive plant populations and wildlife use areas. To the extent practicable, trap and relocate evaluated wildlife species that would be unlikely to escape from storage inundation areas to suitable nearby habitat.

Table D-9. Managed Seasonal Wetland Habitat: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures

Multi-Species Conservation Strategy (MSCS) User Guide: This table lists the types of beneficial and adverse effects on the Natural Community Conservation Plan (NCCP) habitat of implementing all CALFED programs and conservation measures that may be necessary to avoid, minimize, and compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing CALFED actions for a particular summary outcome (see MSCS Table 4-1). Each column lists a summary of effects and conservation measures. Consequently, entries in a column are not related to entries shown in the same row in the other two columns. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in the MSCS technical report "Evaluation Tables and Multi-Species Conservation Strategy Conservation Measures for Natural Community Conservation Plan Communities". This table also lists the evaluated species and Federal Endangered Species Act (FESA) desgnated critical habitats that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely affected by CALFED actions is presented in MSCS Table 2-2.

Associated Evaluated Species and FESA Designated Critical Habitats Potentially Affected by CALFED: Salt-marsh harvest mouse, San Pablo California vole, Suisun ornate shrew, western snowy plover, American peregrine falcon, greater sandhill crane, white-tailed kite, Swainson's hawk, bald eagle, tricolored blackbird, short-eared owl, California gull, long-billed curlew, northern harrier, white-faced ibis, Aleutian Canada goose, black tern, San Pablo song sparrow, Suisun song sparrow, giant garter snake, California red-legged frog, western pond turtle, and vernal pool tadpole shrimp.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Substantial increases in availability and/or quantity of suitable natural wetlands and grassland foraging habitat for waterfowl and other species that also forage in managed seasonal wetlands.	Loss of seasonal wetlands managed for wildlife where managed seasonal wetlands are converted to habitat types of lesser value to associated species.	Avoid or minimize restoring habitat or constructing facilities on lands currently managed to provide high values for evaluated species if restored habitat would be of lesser value to target species.
Increase in the quantity and potential for a substantial increase in habitat values associated with existing managed seasonal wetlands as a result of improved management.	Construction activities associated with actions could result in mortality of evaluated species.	Restore or enhance 1–3 acres of suitable natural or agricultural habitats for species affected by the loss of managed wetlands.
Substantial increase in forage availability and abundance as a result of enhancing wildlife habitat values associated with up to 388,933 acres of agricultural lands for species that also use managed seasonal wetlands.	Construction of storage or conveyance facilities and associated infrastructure could result in the permanent loss of managed seasonal wetlands.	Avoid or minimize construction activities in habitat when evaluated species could be affected by proposed actions.

Table D-9. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into the CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Reduction in the use of herbicides and pesticides in or near existing habitat could result in an increase in invertebrate populations that are prey for some evaluated species and that could be adversely affected by toxic agents.	Loss of managed seasonal wetlands where existing habitat areas are retired to reduce selenium loadings.	To the extent consistent with CALFED objectives, design wetlands to include transition habitat to uplands and upland buffer habitat that would support small mammal populations and provide suitable foraging habitat for raptors and other grassland-associated species.
Levee improvements would result in long-term protection of existing habitat areas from flooding that would result from levee failures.		To the extent consistent with achieving CALFED objectives, manage storage operations to create seasonal wetland habitat areas along shorelines and lands exposed during drawdown periods.
Increase the availability of water for management of existing and created managed seasonal wetlands habitat where water supplies are made available for such uses through water transfers.		
Increase in habitat values associated with existing managed seasonal wetlands as a result of improved management.		
Long-term protection of agricultural lands that provide forage for species that also use managed seasonal wetlands from potential loss or degradation associated with potential future changes in land use.		

Table D-10. Valley/Foothill Riparian Habitat: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures

Multi-Species Conservation Strategy (MSCS) User Guide: This table lists the types of beneficial and adverse effects on the Natural Community Conservation Plan (NCCP) habitat of implementing all CALFED programs and conservation measures that may be necessary to avoid, minimize, and compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing CALFED actions for a particular summary outcome (see MSCS Table 4-1). Each column lists a summary of effects and conservation measures. Consequently, entries in a column are not related to entries shown in the same row in the other two columns. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in the MSCS technical report "Evaluation Tables and Multi-Species Conservation Strategy Conservation Measures for Natural Community Conservation Plan Communities". This table also lists the evaluated species and Federal Endangered Species Act (FESA) designated critical habitats that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely affected by CALFED actions is presented in MSCS Table 2-2.

Associated Evaluated Species and FESA Designated Critical Habitats Potentially Affected by CALFED: San Joaquin Valley woodrat, greater western mastiff-bat, ringtail, riparian brush rabbit, least bell's vireo, bald eagle, Alameda whipsnake, giant garter snake, little willow flycatcher, bank swallow, western yellow-billed cuckoo, white-tailed kite, golden eagle, Swainson's hawk, California yellow warbler, yellow-breasted chat, long-eared owl, Cooper's hawk, osprey, double-crested cormorant (rookery), black-crowned night heron (rookery), great blue heron (rookery), great egret (rookery), and snowy egret (rookery),western pond turtle, foothill yellow-legged frog, Sacramento splittail, California red-legged frog, valley elderberry longhorn beetle, valley elderberry longhorn beetle critical habitat, marsh checkerbloom, Northern California black walnut (native stands), slough thistle, silky cryptantha, and Delta coyote-thistle.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Increase in habitat area where timing and magnitude of flows are sufficient to result in overbank flooding and provide the hydrologic conditions necessary for the natural establishment of riparian vegetation.	Temporary or permanent loss or degradation of existing habitat where construction and maintenance activities result in removal of riparian vegetation.	Avoid or minimize disturbance to existing habitat.
Increase in habitat area where modified channels include features (e.g., benches along setback levees) that allow for the natural reestablishment of riparian vegetation.	Construction-related activities associated with implementing actions could result in mortality of evaluated species.	Restore or enhance 2–5 acres of additional in-kind habitat for every acre of affected habitat near where impacts are incurred before implementing actions that could result in the loss or degradation of habitat.

Table D-10. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Increases in habitat area where sufficient hydrology is present in the upper elevational zones of restored tidal and nontidal wetland habitats to support riparian vegetation.	Water conservation measures could result in localized loss of relatively small habitat areas where riparian vegetation is currently supported primarily by seeps or runoff associated with existing inefficiencies in the use of agricultural water.	To the extent practicable, include project design features that allow for onsite reestablishment and long-term maintenance of riparian vegetation following project construction.
Long-term protection of channel islands that currently support riparian vegetation from potential loss to erosion.	Loss or degradation of existing riparian habitat areas where water is transferred from uses that currently support riparian vegetation.	Avoid or minimize construction activities during the breeding period of evaluated species that could be affected by these actions.
Protection and enhancement of existing riparian habitats where enhancement of seasonal wetlands and agricultural lands also improve the management and quality of associated riparian habitats.	Permanent loss or degradation of riparian habitat along channels upstream of operable barriers if operation of barriers adversely affects the hydrology supporting existing riparian vegetation.	Avoid or minimize direct disturbance to populations and individuals of evaluated plant species.
Protection, restoration, and enhancement of up to 11,100 acres of riparian habitat and riparian habitat associated with up to 235 miles of channel.	Construction of conveyance facilities and associated infrastructure could result in short-term or permanent loss or degradation of riparian habitat.	Establish and protect additional populations of evaluated plant species in suitable nearby habitat areas before implementing construction activities that could affect existing populations or individuals.
Reduction in the use of herbicides and pesticides in or near existing habitat areas could improve the vigor of associated plant populations and result in an increase in invertebrate populations. These invertebrates are prey for some evaluated species and could be adversely affected by toxic agents and.	Loss or degradation of riparian habitat where reduction of contaminant loadings requires disturbance to stream channels that support riparian vegetation.	To the extent practicable, remove or exclude evaluated amphibian and reptile species from construction corridors before construction is initiated.

Table D-10. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Long-term protection, as a result of levee improvements, of existing habitat areas from flooding that would result from levee failures.	Permanent loss and fragmentation of riparian corridors and disruption of wildlife movement patterns if storage facilities and associated infrastructure are constructed in drainages that support valley/foothill riparian habitat.	Avoid or minimize implementing transfers of water from sources that support riparian vegetation.
Increase in riparian habitat area if water transfers are used to augment stream flows to alter stream hydrology sufficiently to allow the natural establishment of riparian vegetation.	Potential for permanent loss or degradation of riparian habitat downstream of storage reservoirs if storage operations adversely affect current channel hydrology supporting existing riparian vegetation.	To the extent consistent with CALFED objectives, operate barriers in a manner that will not adversely affect the hydrology supporting riparian vegetation upstream of barriers.
Long-term increase in riparian habitat area where conveyance channel capacity is increased by setting back channel levees.	Potential for recreation-associated disturbance to evaluated species associated with valley/foothill riparian habitat in the vicinity of new and enlarged storage reservoirs.	Trap and relocate evaluated wildlife species that would be unlikely to escape from storage reservoir inundation areas to suitable nearby habitat areas.
Increase in riparian habitat area if design and operation of Delta storage reservoirs provide suitable substrate and hydrologic conditions to support the natural and long-term establishment of riparian vegetation along storage-island levees and shorelines.		Provide sufficient outflow from storage reservoirs sufficient to support the long-term maintenance of existing riparian vegetation downstream of storage reservoirs.
Increased riparian habitat area where increased sediment transport increases the number and area of point bars and other depositional features along channels that would provide suitable substrates for the natural establishment of riparian vegetation.		Manage recreational uses at new storage reservoirs to reduce or avoid the likelihood for recreation-related impacts on sensitive plant populations and wildlife use areas.

Table D-11. Montane Riparian Habitat: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures

Multi-Species Conservation Strategy (MSCS) User Guide: This table lists the types of beneficial and adverse effects on the Natural Community Conservation Plan (NCCP) habitat of implementing all CALFED programs and conservation measures that may be necessary to avoid, minimize, and compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing CALFED actions for a particular summary outcome (see MSCS Table 4-1). Each column lists a summary of effects and conservation measures. Consequently, entries in a column are not related to entries shown in the same row in the other two columns. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in the MSCS technical report "Evaluation Tables and Multi-Species Conservation Strategy Conservation Measures for Natural Community Conservation Plan Communities". This table also lists the evaluated species and Federal Endangered Species Act (FESA) designated critical habitats that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely affected by CALFED actions is presented in MSCS Table 2-2.

Associated Evaluated Species and FESA Designated Critical Habitats Potentially Affected by CALFED: California wolverine, ringtail, greater western mastiff-bat, least Bell's vireo, bald eagle, little willow flycatcher, California yellow warbler, yellow-breasted chat, long-eared owl, Cooper's hawk, osprey, double-crested cormorant (rookery), black-crowned night heron (rookery), great blue heron (rookery), great egret (rookery), snowy egret (rookery), double-crested cormorant, foothill yellow-legged frog, California red-legged frog, valley elderberry longhorn beetle, valley elderberry longhorn beetle critical habitat, silky cryptantha, saw-toothed lewisia.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Increase in riparian habitat area where water transfers are used to augment stream flows to alter hydrology of streams sufficiently to allow the natural establishment of riparian vegetation.	Loss or degradation of existing riparian habitat where water is transferred from uses that currently support riparian vegetation.	Avoid or minimize transfers of water from sources that support riparian vegetation.
Increased riparian habitat area where increased sediment transport increases the number and area of point bars and other depositional features along channels that would provide suitable substrates for the natural establishment of riparian vegetation.	Temporary or permanent loss or degradation of existing habitat along channels if construction activities result in removal of riparian vegetation.	Restore or enhance 2–5 acres of additional in-kind habitat for every acre of affected habitat near where impacts would occur before implementing actions that could result in the loss or degradation of habitat.
Protection, enhancement, and increase in riparian habitat area where actions to improve montane riverine aquatic habitats improve the processes that support riparian vegetation.	Construction activities associated with actions could result in mortality of evaluated species.	Avoid or minimize disturbance to existing habitat.

Table D-11. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
	Temporary or permanent loss or degradation of riparian habitat where reducing contaminant loadings requires disturbance to stream channels that support riparian vegetation.	Avoid or minimize construction activities during the breeding period of evaluated species that could be affected by these actions.
	Permanent loss and fragmentation of riparian corridors and disruption of wildlife movement patterns where storage facilities and associated infrastructure are constructed in drainages that support montane riparian habitat.	Avoid or minimize direct disturbance to populations and individuals of evaluated plant species.
	Permanent loss or degradation of riparian habitat downstream of storage reservoirs if storage operations adversely affect current channel hydrology supporting existing riparian vegetation.	Establish and protect additional populations of evaluated plant species in suitable nearby habitat before construction activities are implemented that could affect existing populations or individuals.
	Recreation-associated disturbance to evaluated species associated with montane riparian habitats in the vicinity of new and enlarged reservoirs.	Provide outflow from storage reservoirs sufficient to support the long-term maintenance of existing downstream riparian vegetation.
		To the extent practicable, trap and relocate evaluated species that would be unlikely to escape from the inundation area of storage reservoirs to suitable nearby habitat.
		Manage recreational uses at new storage reservoirs to reduce or avoid the likelihood for recreation-related impacts on sensitive plant populations and wildlife use areas.

Table D-12. Grassland Habitat: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures

Multi-Species Conservation Strategy (MSCS) User Guide: This table lists the types of beneficial and adverse effects on the Natural Community Conservation Plan (NCCP) habitat of implementing all CALFED programs and conservation measures that may be necessary to avoid, minimize, and compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing Program actions for a particular summary outcome (see MSCS Table 4-1). Each column lists a summary of effects and conservation measures. Consequently, entries in a column are not related to entries shown in the same row in the other two columns. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in the MSCS technical report "Evaluation Tables and Multi-Species Conservation Strategy Conservation Measures for Natural Community Conservation Plan Communities". This table also lists the evaluated species and Federal Endangered Species Act (FESA) designated critical habitats that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely affected by CALFED actions is presented in MSCS Table 2-2.

Associated Evaluated Species and FESA Designated Critical Habitats Potentially Affected by CALFED: San Joaquin kit fox, Nelson's antelope ground squirrel, greater western mastiff-bat, giant kangaroo rat, Merced kangaroo rat, grasshopper sparrow, western burrowing owl, California condor, tricolored blackbird, short-eared owl, long-billed curlew, northern harrier, Alameda whipsnake, blunt-nosed leopard lizard, San Joaquin whipsnake, California tiger salamander, California red-legged frog, western spadefoot, western spadebootcallippe silverspot, greater sandhill crane, white-tailed kite, golden eagle, Swainson's hawk, mountain plover, Calistoga popcornflower, Hartweg's golden sunburst, large-flowered fiddleneck, large-flowered fiddleneck critical habitat, Marin western flax, San Joaquin adobe sunburst, San Joaquin woollythreads, showy Indian clover, Sonoma spineflower, beaked clarkia, silky cryptantha, Tiburon Indian paintbrush, Tiburon jewelflower, Tiburon Mariposa lily, most beautiful jewel-flower, Mt. Diablo jewel-flower, California vervain, Chinese camp brodiaea, Indian valley brodiaea, rock sanicle, Santa Cruz tarplant, yellow larkspur, recurved larkspur, Hoover's eriastrum, big tarplant, Mt. Diablo fairy-lantern, brittlescale, Congdon's tarplant, Brewer's western flax, drymaria-like western flax, pale-yellow layia, diamond-petaled California poppy, adobe-lily, Diablo helianthella, Hall's tarplant, Jepson's milk-vetch, Ferris' milk-vetch, Clara Hunt's milk-vetch, heartscale, lesser saltscale, Lost Hills crownscale, San Joaquin spearscale, Merced phacelia, white-rayed pentachaeta, Panoche peppergrass, red-flowered lotus, showy madia, Ahart's paronychia, spiny-sepaled button-celery, and Henderson's bent grass.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Increase in habitat area where grassland habitat is allowed to establish along the upper elevation margins of restored wetlands.	Short-term loss or degradation of grassland habitat where construction required for habitat restorations or enhancements disturbs existing habitat.	Before implementing actions that could result in the loss or degradation of habitats occupied by evaluated species, restore or enhance 1–3 acres of grassland within the current range of affected species, and near where impacts would occur.
Enhancement of existing grassland habitats where enhancement of existing seasonal wetlands and agricultural lands also improve the management and quality of associated grasslands.	Permanent loss or degradation of existing grassland habitat where aquatic, wetland, or riparian habitats are restored in existing habitat.	Avoid or minimize construction activities during the breeding period of evaluated species that could be affected by these actions.

Table D-12. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Restoration of 9,000–11,000 acres of perennial grassland habitat.	Loss of grassland habitat where water transfers subsequently result in farming idled or new lands that currently support grassland vegetation.	Avoid or minimize direct disturbance to populations and individuals of evaluated plant species.
Enhancement of grassland habitat associated with managed seasonal wetlands.	Permanent loss of grassland habitat where conveyance facilities and associated infrastructure are constructed in existing habitat.	Establish and protect additional populations of evaluated plant species in suitable nearby habitat before implementing construction activities that could affect existing populations or individuals.
Increased enhancement in narrow corridors of grassland habitat as a result of restoring flood refugia habitat on levees and where grassland habitat is allowed to establish on refurbished or setback levees.	Permanent loss of grassland habitat where storage reservoirs and associated infrastructure are constructed or existing reservoirs are enlarged in existing habitat.	Manage recreational uses to avoid or reduce potential adverse affects on near sensitive plant populations and wildlife use areas.
Reduction in the use of herbicides and pesticides in or near existing grassland habitat could improve the vigor of associated plant populations and result in an increase in invertebrate populations. These invertebrates are prey for some species that could be adversely affected by toxic agents.	Temporary inundation of grassland habitat during flood periods in historical overflow basins that are hydrologically reconnected with channels.	
Long-term protection of existing grassland habitat from flooding as a result of rehabilitating and maintaining Delta and Suisun Marsh levees.	Construction activities associated with actions could result in mortality, harm, or harassment of evaluated species.	
Increase in grassland habitat area where water transfers result in removing lands from agricultural production that subsequently support grassland vegetation.		
Increase in grassland habitat area associated with active floodplains where levees are setback or bank revetment is removed to allow channels to meander.		

Table D-13. Inland Dune Scrub Habitat: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures

Multi-Species Conservation Strategy (MSCS) User Guide: This table lists the types of beneficial and adverse effects on the Natural Community Conservation Plan (NCCP) habitat of implementing all CALFED programs and conservation measures that may be necessary to avoid, minimize, and compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing CALFED actions for a particular summary outcome (see MSCS Table 4-1). Each column lists a summary of effects and conservation measures. Consequently, entries in a column are not related to entries shown in the same row in the other two columns. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in the MSCS technical report "Evaluation Tables and Multi-Species Conservation Strategy Conservation Measures for Natural Community Conservation Plan Communities". This table also lists the evaluated species and Federal Endangered Species Act (FESA) designated critical habitats that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely affected by CALFED actions is presented in MSCS Table 2-2.

Associated Evaluated Species and FESA Designated Critical Habitats Potentially Affected by CALFED: San Joaquin whipsnake, Lange's metalmark, Antioch Dunes evening primrose, Antioch Dunes evening primrose critical habitat, Contra Costa wallflower, and Contra Costa wallflower critical habitat.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Increase in and enhancement of inland dune scrub habitat associated with the Antioch Dunes Ecological Preserve as a result of habitat restoration and enhancement.	Restoration and enhancement of habitat within and adjacent to the Antioch Dunes Ecological Preserve could result in the short-term loss or degradation of suitable habitat if construction required for habitat restoration disturbs existing habitat.	Avoid or minimize disturbance to existing habitat.
Long-term protection of existing habitat resulting from improving land use practices adjacent to the Antioch Dunes Ecological Preserve.	Construction activities associated with habitat restoration and enhancement actions could result in mortality of evaluated species present at the Antioch Dunes Ecological Preserve.	Avoid or minimize direct disturbance to populations and individuals of evaluated plant species and to naked buckwheat, the host plant of the Lange's metalmark.
Increase in populations of evaluated species associated with the Antioch Dunes Ecological Preserve as a result of enhancing and restoring habitat.		

Table D-14. Upland Scrub Habitat: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures

Multi-Species Conservation Strategy (MSCS) User Guide: This table lists the types of beneficial and adverse effects on the Natural Community Conservation Plan (NCCP) habitat of implementing all CALFED programs and conservation measures that may be necessary to avoid, minimize, and compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing CALFED actions for a particular summary outcome (see MSCS Table 4-1). Each column lists a summary of effects and conservation measures. Consequently, entries in a column are not related to entries shown in the same row in the other two columns. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in the MSCS technical report "Evaluation Tables and Multi-Species Conservation Strategy Conservation Measures for Natural Community Conservation Plan Communities". This table also lists the evaluated species and Federal Endangered Species Act (FESA) designated critical habitats that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely affected by CALFED actions is presented in MSCS Table 2-2.

Associated Evaluated Species and FESA Designated Critical Habitats Potentially Affected by CALFED: Ringtail, greater western mastiff-bat, California condor, golden eagle, Swainson's hawk, San Joaquin whipsnake, Alameda whipsnake, limestone salamander, dimorphic snapdragon, El Dorado bedstraw, Marin western flax, pallid manzanita, Pine Hill ceanothus, Pine Hill flannelbush, adobe-lily, San Benito evening-primrose, tree-anemone, Stebbins' morning-glory, Mt. Diablo fairy-lantern, Baker's larkspur, Baker's manzanita, Klamath manzanita, Indian Valley brodiaea, Ione buckwheat, Irish Hill buckwheat, Marin checkerbloom, Layne's ragwort, Mason's ceanothus, dwarf soaproot, Mt. Diablo bird's beak, Mt. Hamilton coreopsis, rock sanicle, Red Hills ragwort, yellow larkspur, Brandegee's eriastrum, Ione manzanita, Ben Lomond buckwheat, Congdon's lomatium, Contra Costa manzanita, Mariposa clarkia, Mt. Diablo jewelflower, most beautiful jewel-flower, Arburua Ranch jewel-flower, Mt. Diablo manzanita, Mt. Hamilton jewelflower, Napa western flax, Brewer's western flax, drymaria-like western flax, Tehama County western flax, Parry's horkelia, Carquinez goldenbush, saw-toothed lewisia, shaggyhair lupine, Sharsmith's harebell, Hall's bush mallow, Mt. Diablo phacelia, and San Antonio Hills monardella.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Potential Effects
	Construction of storage facilities and associated infrastructure could result in permanent loss of habitat.	Avoid or minimize construction activities during the breeding period of evaluated species that are present in existing habitat that could be affected by these actions.
	Construction activities associated with actions could result in mortality of evaluated species.	Avoid or minimize direct disturbance to populations and individuals of evaluated plant species.
	Permanent loss or degradation of existing habitat areas occupied by evaluated species.	Establish and protect additional populations of evaluated plant species in suitable nearby habitat before implementing construction activities that could affect existing populations or individuals.

Table D-14. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Potential Effects
	Recreation-associated disturbance to evaluated species associated with upland scrub habitats in the vicinity of new or enlarged storage reservoirs.	Before implementing actions that could result in the loss or degradation of habitat, restore or enhance 2–5 acres of additional in-kind habitat for every acre of existing habitat occupied by evaluated species affected by the actions within the current range of affected species and near where impacts would occur. Manage recreational uses associated with new or enlarged reservoirs to reduce or avoid the likelihood for recreation-related impacts on sensitive plant populations and wildlife use areas.

Table D-15. Valley/Foothill Woodland and Forest Habitat: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures

Multi-Species Conservation Strategy (MSCS) User Guide: This table lists the types of beneficial and adverse effects on the Natural Community Conservation Plan (NCCP) habitat of implementing all CALFED programs and conservation measures that may be necessary to avoid, minimize, and compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing CALFED actions for a particular summary outcome (see MSCS Table 4-1). Each column lists a summary of effects and conservation measures. Consequently, entries in a column are not related to entries shown in the same row in the other two columns. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in the MSCS technical report "Evaluation Tables and Multi-Species Conservation Strategy Conservation Measures for Natural Community Conservation Plan Communities". This table also lists the evaluated species and Federal Endangered Species Act (FESA) designated critical habitats that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely affected by CALFED actions is presented in MSCS Table 2-2.

Associated Evaluated Species and FESA Designated Critical Habitats Potentially Affected by CALFED: Greater western mastiff-bat, ringtail, California condor, golden eagle, Swainson's hawk, long-eared owl, Cooper's hawk, osprey, Alameda whipsnake, limestone salamander, Shasta salamander, monarch butterfly (roost), Sharsmith onion, dimorphic snapdragon, Mt. Diablo manzanita, Baker's manzanita, Clara Hunt's milk-vetch, Big Bear Valley woollypod, Jepson's milk-vetch, tree-anemone, El Dorado bedstraw, Hartweg's golden sunburst, rock sanicle, English peak greenbriar, Layne's ragwort, pallid manzanita, Pine Hill ceanothus, Pine Hill flannelbush, adobe-lily, Hall's tarplant, Brewer's western flax, drymaria-like western flax, Naps western flax, Tehama County western flax, pale-yellow layia, Bellinger's meadowfoam, Mt. Tedoc linanthus, Madera linanthus, San Benito evening-primrose, San Joaquin adobe sunburst, Mt. Diablo phacelia, Stebbin's morning-glory, Mt. Diablo fairy-lantern, California vervain, Ione manzanita, Rawhide Hill onion, Ben Lomond buckwheat, Congdon's lomatium, Hospital Canyon larkspur, recurved larkspur, Brandegee's eriastrum, Mariposa clarkia, Shasta clarkia, beaked clarkia, Mt. Hamilton coreopsis, silky cryptantha, Mt. Hamilton jewelflower, red-flowered lotus, Parry's horkelia, shaggyhair lupine, showy madia, Shasta snow-wreath, Ahart's paronychia, thread-leaved beardtongue, and San Antonio Hills monardella.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Protection of up to 500 acres of existing woodlands adjacent to existing protected lands.	Construction of conveyance channels could result in the loss of individual trees within woodlands.	Avoid or minimize disturbance to existing habitat.
Increase in habitat area where restoration of stream meander corridors and associated floodplain processes create conditions suitable for the natural reestablishment of valley oak woodland or savanna habitat.	Construction activities associated with actions could result in mortality of evaluated species.	Restore or enhance 2–5 acres of additional in-kind habitat for every acre of existing habitat adversely affected by the actions near where impacts would be incurred.
	Construction of storage facilities and associated infrastructure could result in permanent loss of habitat.	Avoid or minimize construction activities during the breeding period of evaluated species that could be affected by the actions.

Table D-15. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
	Potential for recreation-associated disturbance to evaluated species associated with valley/foothill woodland and forest habitats in the vicinity of new or enlarged storage reservoirs.	Avoid or minimize direct disturbance to populations and individuals of evaluated plant species. Establish and protect additional populations of evaluated plant species in suitable nearby habitat before implementing construction activities that could affect existing populations or individuals. Manage recreational uses to reduce or avoid the likelihood for recreation-related impacts on sensitive plant populations and wildlife use areas in the vicinity of new or enlarged storage reservoirs.

Table D-16. Montane Woodland and Forest Habitat: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures

Multi-Species Conservation Strategy (MSCS) User Guide: This table lists the types of beneficial and adverse effects on the Natural Community Conservation Program (NCCP) habitat of implementing all CALFED programs and conservation measures that may be necessary to avoid, minimize, and compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing CALFED actions for a particular summary outcome (see MSCS Table 4-1). Each column lists a summary of effects and conservation measures. Consequently, entries in a column are not related to entries shown in the same row in the other two columns. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in the MSCS technical report "Evaluation Tables and Multi-Species Conservation Strategy Conservation Measures for Natural Community Conservation Plan Communities". This table also lists the evaluated species and Federal Endangered Species Act (FESA) designated critical habitats that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely affected by CALFED actions is presented in MSCS Table 2-2.

Associated Evaluated Species and FESA Designated Critical Habitats Potentially Affected by CALFED: Ringtail, greater western mastiff-bat, California wolverine, northern spotted owl, northern spotted owl critical habitat, bald eagle, Cooper's hawk, osprey, Shasta salamander, Shasta sideband, Indian Valley brodiaea, North Coast semaphore grass, rock sanicle, dimorphic snapdragon, Klamath manzanita, Big Bear Valley woollypod, tree-anemone, silky cryptantha, drymaria-like western flax, Mt. Tedoc linanthus, Madera linanthus, Shasta snow-wreath, thread-leaved beardtongue, California beaked-rush, marsh skullcap, Red Hills ragwort, English peak greenbriar, pallid manzanita, and saw-toothed lewisia.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
	Construction of storage facilities and associated infrastructure could result in permanent loss of habitat.	Restore or enhance 2–5 acres of additional in-kind habitat for every acre of existing habitat affected by the actions near where impacts would occur.
	Construction activities associated with actions could result in mortality of evaluated species.	Avoid or minimize construction activities during the breeding period of evaluated species that are present in existing habitat that could be affected by the actions.
	Potential for recreation-associated disturbance to evaluated species associated with montane woodland and forest habitats in the vicinity of new or enlarged storage reservoirs.	Avoid or minimize direct disturbance to populations and individuals of evaluated plant species.
		Establish and protect additional populations of evaluated plant species in suitable nearby habitat before implementing construction activities that could affect existing populations or individuals.

Table D-16. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
		Manage recreational uses to reduce or avoid the likelihood for recreation-related impacts on sensitive plant populations and wildlife use areas in the vicinity of new or enlarged reservoirs.

Table D-17. Upland Cropland Habitat: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures

Multi-Species Conservation Strategy (MSCS) User Guide: This table lists the types of beneficial and adverse effects on the Natural Community Conservation Plan (NCCP) habitat of implementing all CALFED programs and conservation measures that may be necessary to avoid, minimize, and compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing CALFED actions for a particular summary outcome (see MSCS Table 4-1). Each column lists a summary of effects and conservation measures. Consequently, entries in a column are not related to entries shown in the same row in the other two columns. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in the MSCS technical report "Evaluation Tables and Multi-Species Conservation Strategy Conservation Measures for Natural Community Conservation Plan Communities". This table also lists the evaluated species and Federal Endangered Species Act (FESA) designated critical habitats that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely affected by CALFED actions is presented in MSCS Table 2-2.

Associated Evaluated Species and FESA Designated Critical Habitats Potentially Affected by CALFED: San Joaquin kit fox, Aleutian Canada goose, greater sandhill crane, white-tailed kite, Swainson's hawk, western burrowing owl, mountain plover, tricolored blackbird, California gull, long-billed curlew, northern harrier, and white-faced ibis.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Substantial increases in availability and/or quantity of suitable wetland and grassland forage habitat for waterfowl and other species that also forage in upland cropland habitat.	Loss of high-value wildlife foraging habitat (e.g., cornfields and wheat fields) resulting from conversion of upland cropland habitats to seasonally flooded agriculture, aquatic, wetland, riparian, or grassland habitat.	To the extent practicable, restore aquatic, wetland, riparian, and grassland habitats on agricultural lands that have relatively low forage value (e.g., orchards and vineyards).
Substantial increase in forage availability and abundance for waterfowl, sandhill cranes, raptors, and other species as a result of enhancing wildlife habitat values associated with up to 388,933 acres of agricultural lands.	Construction activities associated with actions could result in mortality of evaluated species.	Restore or enhance 1–3 acres of suitable natural foraging habitat near affected lands for every acre of affected habitat regularly used by evaluated species and waterfowl to replace forage values of converted agricultural lands before or when project impacts are incurred.

Table D-17. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Reduction in the use of herbicides and pesticides in or near existing habitat could result in an increase in invertebrate populations that are adversely affected by toxic agents and that are prey for some evaluated species.	Loss of upland cropland habitat or forage where actions to reduce herbicide and pesticide loadings include growing crops with lower forage value than crops currently being grown, idling of cropland, or reduction in forage biomass.	Increase suitable forage availability and/or quantity on 1–5 acres of agricultural lands near affected lands for every acre of affected habitat regularly used by evaluated species or waterfowl to replace forage values of converted agricultural lands before or when project impacts are incurred.
Levee improvements would result in long-term protection of existing habitat from flooding that would result from levee failures.	Loss of upland cropland habitat or forage where actions to improve water use efficiency include growing crops with lower forage value than crops that are currently being grown, idling of cropland, or reduction in forage biomass.	Avoid or minimize construction activities in habitat when evaluated species are present and could be affected by proposed actions.
Increase in upland cropland habitat or forage where actions to increase water use efficiency result in converting agricultural lands that require extensive seasonal flooding to row or grain crops, or eliminates fall or winter flooding of fields to control weeds.	Loss of upland cropland habitat if water is transferred from this use.	To the extent consistent with achieving CALFED objectives, design wetlands to include transition habitat to uplands and upland buffer habitat that would support small mammal populations and provide suitable foraging habitat for raptors and other grassland-associated species.
	Construction of storage or conveyance facilities and associated infrastructure could result in the permanent loss of upland cropland with high wildlife forage habitat value.	To the extent consistent with achieving CALFED objectives, manage restored and enhanced seasonal wetlands to maximize the availability or quantity of suitable forage for waterfowl and sandhill cranes.

Table D-17. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
	Potential loss of high-value upland cropland foraging habitat where these croplands are retired to reduce selenium loadings.	To the extent consistent with achieving CALFED objectives, design restored and enhanced wetlands and seasonally flooded agricultural habitats to include areas of habitat suitable for small mammals. These areas would serve as refugia during periods when wetlands are flooded and would provide source populations for reoccupation of wetland areas during periods that wetlands are dry. To the extent consistent with achieving CALFED objectives, design and manage restored grasslands to maximize prey abundance and availability for raptors and provide habitat for other grassland-associated species. Avoid or minimize seasonal flooding of upland croplands that are regularly used by sandhill cranes and other species that primarily forage in upland habitats. Avoid or minimize changing cropping practices on upland croplands that provide high forage values for wildlife. To the extent consistent with CALFED objectives, avoid constructing storage and conveyance facilities and associated infrastructure on upland cropland with high wildlife forage habitat value.

Table D-18. Seasonally Flooded Agricultural Habitat: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures

Multi-Species Conservation Strategy (MSCS) User Guide: This table lists the types of beneficial and adverse effects on the Natural Community Conservation Plan (NCCP) habitat of implementing all CALFED programs and conservation measures that may be necessary to avoid, minimize, and compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing CALFED actions for a particular summary outcome (see MSCS Table 4-1). Each column lists a summary of effects and conservation measures. Consequently, entries in a column are not related to entries shown in the same row in the other two columns. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in the MSCS technical report "Evaluation Tables and Multi-Species Conservation Strategy Conservation Measures for Natural Community Conservation Plan Communities". This table also lists the evaluated species and Federal Endangered Species Act (FESA) designated critical habitats that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely affected by CALFED actions is presented in MSCS Table 2-2.

Associated Evaluated Species and FESA Designated Critical Habitats Potentially Affected by CALFED: Bald eagle, Aleutian Canada goose, giant garter snake, greater sandhill crane, white-tailed kite, Swainson's hawk, tricolored blackbird, short-eared owl, California gull, long-billed curlew, northern harrier, and white-faced ibis.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Substantial increases in availability and/or quantity of suitable wetland and grassland forage habitat for waterfowl and other species that also forage in seasonally flooded agricultural habitat.	Loss of high value wildlife foraging habitat (e.g., flooded cornfields and wheat fields) resulting from conversion of agricultural lands to upland cropland, aquatic, wetland, riparian, or grassland habitat.	To the extent practicable, restore aquatic, wetland, riparian, and grassland habitats on agricultural lands that have relatively low forage value (e.g., orchards and vineyards).
Substantial increase in forage availability and abundance for waterfowl, sandhill cranes, raptors, and other species as a result of enhancing wildlife habitat values associated with up to 388,933 acres of agricultural lands.	Construction activities associated with actions could result in mortality of evaluated species.	Restore or enhance 1–3 acres of suitable natural foraging habitat near affected lands for every acre of affected habitat regularly used by evaluated species and waterfowl to replace forage values of converted agricultural lands before or when project impacts are incurred.
Reduction in the use of herbicides and pesticides in or near existing habitat could result in an increase in invertebrate populations that are prey for some evaluated species and could be adversely affected by toxic agents.	Loss of seasonally flooded agricultural habitats or forage where actions to reduce herbicide and pesticide loadings include growing crops with lower forage value than crops currently being grown, idling of cropland, or reduction in forage biomass.	Increase suitable forage availability and/or quantity on 1–5 acres of agricultural lands near affected lands for every acre of affected habitat regularly used by evaluated species or waterfowl to replace forage values of converted agricultural lands before or when project impacts are incurred.

Table D-18. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Levee improvements would result in long-term protection of existing habitat from flooding that would result from levee failures.	Loss of seasonally flooded agricultural habitat area and forage abundance or availability if water conservation actions result in reducing the amount or duration of water applied to agricultural lands.	Avoid converting seasonal agricultural wetlands that are used as roosts by wintering sandhill cranes to other habitat types.
Increase in seasonally flooded agricultural habitat area where water supplies are made available for such uses through water transfers.	Loss of seasonally flooded agricultural habitat if water is transferred from this use.	Avoid or minimize construction and management activities in habitat areas when evaluated species are present and could be affected by proposed actions.
Increase in forage habitat value for some species if storage facilities are located on Delta islands that support crops with little or no forage value and storage islands are operated in a manner that results in the creation of wetland habitats.	Construction of storage and conveyance facilities and associated infrastructure could result in the permanent loss of seasonally flooded agricultural lands with high wildlife forage habitat value.	To the extent consistent with achieving CALFED objectives, design wetlands to include transition habitat to uplands and upland buffer habitat area that would support small mammal populations and provide suitable foraging habitat for raptors and other grassland-associated species.
	Loss of high-value seasonally flooded agricultural foraging habitat where these croplands are retired to reduce selenium loadings.	To the extent consistent with achieving CALFED objectives, manage restored and enhanced seasonal wetlands to maximize the availability or quantity of suitable forage for waterfowl and sandhill cranes. Avoid or minimize transfers of water from sources that support high-value seasonally flooded agricultural habitat. To the extent consistent with CALFED objectives, avoid constructing storage and conveyance facilities and associated infrastructure on seasonally flooded agricultural lands with high wildlife forage habitat value.

Table D-19. Anadromous Fish Group: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures

Multi-Species Conservation Strategy (MSCS) User Guide: This table lists the types of beneficial and adverse effects on the Natural Community Conservation Plan (NCCP) habitat of implementing all CALFED programs and conservation measures that may be necessary to avoid, minimize, and compensate for adverse impacts on the NCCP habitat. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing CALFED actions for a particular summary outcome (see MSCS Table 4-1). Each column lists a summary of effects and conservation measures. Consequently, entries in a column are not related to entries shown in the same row in the other two columns. Detailed descriptions of potential effects and conservation measures for each NCCP habitat by CALFED region and summary outcome are presented in the MSCS technical report "Evaluation Tables and Multi-Species Conservation Strategy Conservation Measures for Natural Community Conservation Plan Communities". This table also lists the evaluated species and Federal Endangered Species Act (FESA) designated critical habitats that are associated with the NCCP habitat. The potential for a particular species to be beneficially or adversely affected by CALFED actions is presented in MSCS Table 2-2.

Associated Evaluated Species and FESA Designated Critical Habitats Potentially Affected by CALFED: Sacramento River winter-run chinook salmon evolutionarily significant unit (ESU), Sacramento River winter-run chinook salmon ESU critical habitat, Central Valley fall-/late-fall-run chinook salmon ESU, Central Valley spring-run chinook salmon ESU, Central Valley spring-run chinook salmon ESU critical habitat, Central Valley steelhead ESU, Central Valley steelhead ESU critical habitat, Central California Coast steelhead ESU critical habitat, and green sturgeon.

Potential Beneficial Effects[1]	Potential Adverse Effects[1]	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
An increase in the freshwater inflow in fall, winter, and spring would increase the area of freshwater- and low-salinity migratory and juvenile rearing habitat in the Bay-Delta, and improve foodweb productivity. Increased inflows would also improve cues for immigrating adult salmon and sturgeon.	Reallocation of seasonal and multi-year water supplies to enhance spring and fall river flows and Delta inflow could limit available water supply in other seasons and future years, particularly during critical years and extended droughts, which could adversely affect survival at those times in the opposite manner as stated for benefits. Steelhead are likely to be most adversely affected by flow reallocations that enhance spring and fall flows. High summer flows help reduce water temperatures for rearing juvenile steelhead. Reduced summer flow could also increase susceptibility of emigrating juvenile green sturgeon to entrainment in diversions.	Implement measures on an emergency basis during extended droughts to protect water supplies dedicated to meet Delta inflow and outflow criteria deemed essential in maintaining anadromous fish populations. Such measures would be implemented infrequently and would be used only to readjust water supplies to levels expected without this set of CALFED actions. Measures may include additional dedicated surface or ground water stored specifically for this purpose, special options for the purchase of needed additional supplies, or emergency provisions that would reduce other water supply demands. Another measure is initially to implement the actions to the extent feasible to determine potential effects on seasonal and critical-year water supplies and develop a long-term water management plan that includes this and other actions to minimize effects of reallocation in other seasons and critical years.

Table D-19. Continued

Potential Beneficial Effects[1]	Potential Adverse Effects[1]	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
An increase in inflow in spring would increase the frequency of the low-salinity zone being located in more productive shallow bays of the western Delta and North Bay rather than interior Delta channels, which could lead to higher food production and food availability for juvenile salmonids.	Restricting cross-Delta transport of water in some channels, and focusing transport to other selected channels may increase transport of fish toward south Delta pumping plants in the selected channels, and reduce water quality in other channels to a point that may reduce survival.	To the extent consistent with CALFED objectives, adjust hydraulics in various channels or construct and operate structures (e.g., the Head of Old River barrier) to ensure fish are not being drawn in greater numbers or proportions toward the pumps. Implement monitoring and testing necessary to design, construct, and operate barriers. Develop and implement procedures and operating criteria for barriers to protect fish. Implement monitoring necessary to detect movement of fish toward the south Delta pumping plants, and implement water management strategies that allow for reduced exports when anadromous fish are at risk. Develop water quality monitoring to detect adverse conditions for anadromous fish. Implement programs to improve water quality through source control, improved drainage management, improved treatment, and dilution.
Reduced cross-Delta flow increases the proportion of emigrating salmonid smolts from the Sacramento River basin that remain in the mainstem and experience higher survival rates (e.g., U. S. Fish and Wildlife Service 1998).	Closure of the Delta Cross Channel (DCC) from November through January could increase export losses of fish from east Delta and San Joaquin River tributaries by increasing net upstream flows in the lower San Joaquin River channel (i.e., negative QWEST flows) and diverting greater proportions of these tributaries' inflows and their downstream migrating juvenile fish to the South Delta pumping plants.	To the extent consistent with CALFED objectives, implement monitoring and testing necessary to define operations of the DCC gates from November through January that achieve benefits to Sacramento basin anadromous fish and avoid potential detriments to anadromous fish from other basins and to other Delta and estuarine fish.

Table D-19. Continued

Potential Beneficial Effects[1]	Potential Adverse Effects[1]	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
If increased spring inflow is sufficient to flood bypasses more frequently, juvenile salmonids could benefit from improved food supply in these habitats, resulting in increased growth rates and survival.	Construction activities could result in mortality of anadromous fish.	Avoid or minimize in-channel construction activities during periods when anadromous fish species are present in high abundance or when life stages are present that are most susceptible to adverse effects associated with implementing actions.
Increased spring inflow would increase river silt load and flood more shoreline vegetation, which may reduce predation through greater turbidity and increase the available escape habitat.	Reactivation of flow to historical overflow basins and restoration of tidal wetlands may lead to stranding of anadromous fish if sufficient connectivity to main channels is not provided. Flooding of these agricultural lands could increase loading of the Sacramento River with contaminants that adversely affect juvenile salmonids.	Implement proposed restoration actions in areas that (1) have the greatest potential to support high densities of anadromous fish and (2) that will link currently disjunct habitat patches. Avoid or minimize implementing development actions in habitat areas that currently support high densities of anadromous fish, or in locations that would reduce connectivity among habitat patches.
Increased spring inflow could reduce competition and predation from non-native species adversely affected by increased flows or seasonally lower Bay-Delta salinity levels (e.g., Asian clams).	Non-native fish species may aggressively colonize enhanced and restored tidal and other aquatic habitats. Increased abundance of non-native species that compete with or prey upon anadromous fish may negate the habitat value of restored areas and could reduce survival and abundance of native anadromous fish.	To the extent consistent with CALFED objectives, recontour existing flood bypasses, and design and construct new flood bypasses from existing leveed lands in stages using construction design, operating schemes, and procedures developed through pilot studies and project experience that minimize the potential for stranding as waters recede from bypasses. Increased spring inflow could reduce the loss of juvenile anadromous fish to water diversions by decreasing the proportion of water diverted, and by reducing negative flows in the lower San Joaquin River portion of the Delta. Removing levees and opening leveed lands to tidal action could have transient negative effects due to changes in hydraulics and reduced water quality.

Table D-19. Continued

Potential Beneficial Effects[1]	Potential Adverse Effects[1]	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Increased spring inflow may reduce the concentrations of contaminants.	Filling Delta channels to create channel islands could result in the loss of small amounts of shallow-water habitat.	To the extent consistent with CALFED objectives, confine additional winter pumping for flooding agricultural lands to times and areas of channels with low densities of anadromous fish.
Restoration or enhancement of up to 73,000 acres of tidal habitats and up to 330 miles of tidal sloughs in the Bay-Delta would increase the area of rearing habitat, and could improve foodweb productivity.	Develop techniques that minimize effects on hydraulics and water quality from restoring subsided leveed lands to tidal wetlands.	To the extent consistent with CALFED objectives, confine additional winter diversions necessary to manage restored seasonal wetlands to non-dry years when water supplies are sufficient to minimize any effects on downstream transport, export pumping ratios, and foodweb productivity.
Closure of the DCC, particularly in the November-through-January period, would increase net freshwater inflow into the western Delta from the Sacramento River, which could improve transport of Sacramento River fish to the shallow bays of the western Delta and Suisun Bay, improve habitat in those areas, and reduce entrainment at south Delta pumping plants.	Construct channel islands in locations that will minimize disruption and degradation of existing shallow-water and shaded riverine aquatic (SRA) habitats and that will result in a net gain in areal extent and connectivity of these habitats.	To the extent consistent with CALFED objectives, place consolidated intakes in areas with minimal numbers of juvenile anadromous fish.
	Temporary and localized increases in turbidity could result from construction required to implement habitat restoration or other CALFED actions.	
Closure of the DCC during the winter could reduce straying of immigrating adult Sacramento River salmonids into the central Delta. Increasing the proportion of fish that migrate through the lower Sacramento River could reduce migration time and improve chances of successful spawning in the Sacramento River and its tributaries.	Consolidated larger and fewer diversions and positive-barrier bypass-screen systems could increase predation losses of anadromous fishes migrating through the Delta.	Design and construct a new fish-screen system at the entrance to Clifton Court Forebay to alleviate the loss of juvenile anadromous fish to predation in the forebay and to the existing ineffective fish-bypass and collection facility within the forebay.

Table D-19. Continued

Potential Beneficial Effects[1]	Potential Adverse Effects[1]	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
	An increase in agricultural water diversions in the Delta during winter to create managed seasonal wetlands could lead to an increase in entrainment losses of juvenile salmonids. In dry years, net downstream transport of juvenile anadromous fish through the Delta could be reduced.	
Operation of the barrier at the head of Old River in the fall could benefit adult immigration of east Delta and San Joaquin River tributary salmon and steelhead to their spawning rivers and improve water quality in the eastern Delta, including the San Joaquin River channel near Stockton, which may improve fish escapement to spawning grounds.	To the extent practicable, install screens on agricultural diversion intakes to avoid entrainment of anadromous fish.	Screen intakes or connect intakes of the Tracy Pumping Plant (Central Valley Project) to the screened Clifton Court Forebay to alleviate loss of fish at the Tracy Fish Protection Facility.
Improving and restoring Yolo Bypass channels and drainage could reduce stranding losses of juvenile anadromous fish in the Bypass, provide added rearing habitat, and improve foodweb productivity in the Bypass and Delta.	Reducing the total loadings of organic material in the aquatic environment could reduce foodweb productivity.	Screen all Delta diversions that may entrain juvenile anadromous fish.
	Upgrading levees could degrade existing riparian, wetland, and SRA habitats along existing levees. Additional adverse impacts listed above would also be associated with levee upgrades.	
Expanded and restored slough habitat would increase the area of aquatic habitat, including shallow-water and SRA habitats, which would provide additional rearing habitat for juvenile salmonids and increase foodweb productivity.	Further development of water transfers could lead to a shift in water diversions from the Delta to periods with higher risk of losses to entrainment or changes in timing and location of diversions that could adversely affect migrating and rearing habitat in the Delta or elsewhere.	Restore or enhance 1–3 times the amount of tidal habitat affected by levee upgrades near where impacts are incurred.

Table D-19. Continued

Potential Beneficial Effects[1]	Potential Adverse Effects[1]	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Protection, enhancement, and restoration of riparian habitat along channels and channel islands would increase SRA habitat and shallow-water habitat, which could improve water temperatures, provide more migrating and rearing habitat, and improve foodweb productivity.	Alteration of south-Delta channels could increase chances of some anadromous fish being drawn to and lost or damaged to south-Delta pumping plants.	To the extent consistent with CALFED objectives, include project design features that allow for onsite reestablishment and long-term maintenance of aquatic, wetland, and riparian habitat following project construction.
Avoiding dredging at times and places in the Delta when juvenile anadromous fish are present and feeding in abundance would improve fish feeding habitats and potentially improve juvenile survival and increase adult populations.	Alteration of conveyance features at south-Delta pumping plants could increase the pumping capacity, which could lead to increasing entrainment and salvage losses at the intake facilities or possibly have adverse effects on migration and rearing habitat.	Reductions in unnatural inputs of organic carbon could be replaced with increased natural organic inputs such as from restored tidal wetlands and riparian habitats.
Reducing the abundance of non-native aquatic species and possibly reducing competition and predation.	The discharge of Sacramento River water into the interior Delta via Snodgrass Slough could result in some adult anadromous fishes bound for the Sacramento River and its tributaries being drawn into the central Delta and up to the discharge point during annual spawning migrations up the Sacramento River.	Water transfers should be conducted so as not to increase exports during times of the year when anadromous fish are more vulnerable to damage or loss at project facilities or when their habitat may be adversely affected.
Consolidating diversions and upgrading fish screens and handling systems could reduce entrainment losses.	Diversion of Sacramento River water into Snodgrass Slough via a screened intake on the Sacramento River could lead to predation and impingement losses of young anadromous fish at the intake.	Construction and operation of new or improved conveyance features in the north and south Delta should be designed to minimize losses of anadromous fishes and to improve migrating, rearing, and feeding habitats.

Table D-19. Continued

Potential Beneficial Effects[1]	Potential Adverse Effects[1]	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Reduction in illegal net fishing and further limitations on legal fisheries could reduce losses of juvenile and adult anadromous fish.	Diversion of Sacramento River water into Snodgrass Slough without screening could result in greater numbers of anadromous fish from the Sacramento River being drawn into the interior Delta where they may have poorer habitat, be delayed in migration to the ocean, or have a greater chance of being drawn into south-Delta pumping plants.	Design and operate proposed new diversions from the Sacramento River to minimize adverse effects on migrating anadromous fish, to avoid blocking upstream migration of fish to the Sacramento River, and to improve habitat conditions for anadromous fish.
Reduction in the levels of contaminants being released into Delta channels could increase foodweb productivity and improve anadromous fish survival.	The increase in flushing rate of the interior northern portion of the central Delta could alter foodweb productivity and tidal freshwater habitat conditions that could limit production of anadromous fishes in the area.	
Proposed habitat improvements along upgraded levees (e.g., shallow slopes and vegetated berms) could improve rearing and migratory habitat.	Construction and operation of north-Delta conveyance features could reduce habitat values and foodweb productivity.	
Increased freshwater inflow to Delta and Bay and reductions in exports and export related losses of anadromous fish through water conservation if saved water is used to augment freshwater inflow to the Delta.	An isolated conveyance facility could result in entrainment, predation, and impingement losses of Sacramento fish at the intake of the facility. Juvenile fish would be vulnerable to handling effects at intake screens.	
Further development of water transfers could lead to reductions in exports at high risk times of the year, which could reduce losses of anadromous fishes at project pumping plants or adverse habitat changes caused by water exports.	An isolated conveyance facility would lead to reduced flow rates in the mainstem Sacramento River below the point of diversion, and a greater proportion of this reduced flow would enter the central Delta.	

Table D-19. Continued

Potential Beneficial Effects[1]	Potential Adverse Effects[1]	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Alteration of channels in the south Delta could improve habitat in altered and other channels, which could lead to greater foodweb productivity, improved migrating and rearing habitat, and reduced entrainment and salvage losses at south Delta pumping plants. Improvements to Central Valley Project-State Water Project conveyance features at south Delta pumping plants (e.g., Joint Point of Diversion) could reduce vulnerability of anadromous fish to entrainment and salvage losses at the intakes of the facilities. An isolated conveyance facility could improve migrating, rearing, and feeding habitat, improve foodweb productivity, reduce losses to water diversions, and improve transport of juvenile fish to optimum rearing areas in the Delta and Bay, especially for San Joaquin River salmonids. Increased natural river flows, improved sediment supplies, and enhancement and restoration of aquatic and SRA habitats associated with major Bay-Delta tributaries would improve spawning, rearing, and migrating habitat for anadromous fish. Improvements to passage routes could increase access to spawning and rearing areas.		

Table D-19. Continued

Potential Beneficial Effects[1]	Potential Adverse Effects[1]	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Reduction of predation levels on juvenile anadromous fish could result in increased numbers of juveniles successfully outmigrating to the Bay-Delta. Improvement in the genetic integrity of anadromous fish stocks could improve spawning success, juvenile survival, and adult homing success.		

Notes:

[1] Unless otherwise stated, the outcomes of beneficial and adverse effects are in terms of juvenile condition and survival to enter salt water, adult survival during freshwater immigration, adult spawning success, and population abundance.

Acronyms:

DCC	Delta Cross Channel
ESU	evolutionarily significant unit
FESA	Federal Endangered Species Act
MSCS	Multi-Species Conservation Strategy
NCCP	Natural Community Conservation Plan
SRA	shaded riverine aquatic

Citations:

U.S. Fish and Wildlife Service. 1998. Annual progress report: Abundance and survival of juvenile chinook salmon in the Sacramento-San Joaquin River estuary.

Table D-20. Estuarine Fish Group: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures

Multi-Species Conservation Strategy (MSCS) User Guide: This table lists the types of beneficial and adverse effects on the Natural Community Conservation Plan (NCCP) fish group of implementing all CALFED programs and conservation measures that may be necessary to avoid, minimize, and compensate for adverse impacts on the fish group. Consequently, only a subset of the effects and conservation measures presented here may apply to implementing CALFED actions for a particular summary outcome (see MSCS Table 4-1). Each column lists a summary of effects and conservation measures. Consequently, entries in a column are not related to entries shown in the same row in the other two columns. Detailed descriptions of potential effects and conservation measures for each NCCP community by CALFED region and summary outcome are presented in the MSCS technical report "Evaluation Tables and Multi-Species Conservation Strategy Conservation Measures for Natural Community Conservation Plan Communities". This table also lists the evaluated species and Federal Endangered Species Act (FESA) designated critical habitats that are associated with the NCCP fish group. The potential for a particular species to be beneficially or adversely affected by CALFED actions is presented in MSCS Table 2-2.

Associated Evaluated Species and FESA Designated Critical Habitats Potentially Affected by CALFED: Tidewater goby, delta smelt, delta smelt critical habitat, longfin smelt, Sacramento splittail, and Sacramento perch.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Improved fall, winter, and spring flows through the Delta would improve spawning, rearing, and migration habitat conditions for estuarine fish, which could result in higher fish survival and population levels.	Reallocation of seasonal and multi-year water supplies to enhance spring and fall river flows and Delta inflow could limit available water supply in other seasons and future years, particularly during critical years and extended droughts, which could adversely affect survival of native estuarine fish at those times.	Implement measures on an emergency basis during extended droughts to protect water supplies dedicated to meet Delta inflow and outfall criteria deemed essential in maintaining native estuarine fish populations. Such measures would be implemented infrequently and would be used only to readjust water supplies to levels expected without this set of CALFED actions. Measures may include additional dedicated surface or ground water stored specifically for this purpose, special options for the purchase of needed additional supplies, or emergency provisions that would reduce other water supply demands. Another measure is to initially implement the actions to the extent feasible to determine potential effects on seasonal and critical-year water supplies, and develop a long-term water management plan that includes this and other actions to minimize effects of reallocation in other seasons and critical years.

Table D-20. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
An increase in inflow in spring would increase the frequency of the low-salinity zone being located in more productive shallow bays of the Western Delta and North Bay rather than interior Delta channels, which could lead to higher estuarine food production, greater estuarine juvenile fish survival, and higher population levels.		To the extent consistent with CALFED objectives, construct and operate in-channel barriers and restrictions to provide sufficient leeway to adjust hydraulics in various channels to ensure fish are not being drawn in greater numbers or proportions toward the pumps or being affected by poor water quality. Implement monitoring and testing necessary to design, construct, and operate barriers and restrictions. Develop and implement procedures and operating criteria for barrier systems to protect fish. Implement monitoring and testing necessary to ensure against excessive movement of fish toward the south-Delta pumping plants.
Increased spring inflow would increase river silt load and flood more shoreline vegetation, which may reduce predation through greater turbidity, increase the available escape habitat, and subsequently could increase survival and population abundance of native estuarine fish.		
Increased spring inflow would reduce competition from non-native species adversely affected by increased flows (e.g., Asian clams) or seasonally lower Bay-Delta salinity levels, which could lead to greater survival and higher population levels of native estuarine fish.		

Table D-20. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Increased spring and fall Bay-Delta inflow would reduce the loss of native estuarine fish to water diversions by decreasing the amount of water diverted and reducing negative flows in the lower San Joaquin River portion of the Delta, which could lead to greater survival and higher population levels.	Operation of a barrier at the head of Old River during key periods could increase export losses of fish residing in the west, central, and south Delta.	To the extent consistent with CALFED objectives, constrain operation of a barrier at the head of Old River during key periods as necessary to minimize the extent of fish exposure to the south-Delta pumping plants. Implement monitoring and testing necessary to balance the loss of fish from the San Joaquin River, and the west, central, and south Delta.
Increased spring inflow may reduce the concentrations of toxins, which could lead to greater survival and higher population levels of native estuarine fish.	Construction and other disturbance-causing activities associated with particular CALFED actions could result in mortality of estuarine fish species.	Avoid or minimize in-channel construction activities during periods estuarine fish species would be most susceptible to adverse effects that could be associated with implementing proposed actions.
Restoration of up to 73,000 acres of tidal shallow water and emergent wetland habitat and up to 330 miles of tidal sloughs in the Bay-Delta would substantially increase the area spawning and rearing habitat, and could substantially improve foodweb productivity, which could increase survival and population levels of native estuarine fish.	Reactivation of flow to historical overflow basins and restoration of tidal wetlands may lead to stranding of native estuarine fish if sufficient drainage is not provided, which could reduce survival and population abundance.	Avoid or minimize implementing proposed actions in occupied habitat areas that could have a substantial adverse effect on the distribution or abundance estuarine fish species.
Restricting flow toward the export pumps in some Delta channels will increase residence time of water, which could potentially improve foodweb productivity and reduce export losses of native estuarine fish.	Enhancement and restoration of aquatic and tidal wetland habitat area may increase abundance of non-native species by providing additional habitat. Non-native species may compete with or prey on these species, reducing survival and population abundance.	To the extent consistent with CALFED objectives, design and construct overflow basins from existing leveed lands in stages using construction design, operating schemes, and procedures developed through pilot studies and project experience to minimize the potential for stranding as waters recede from overflow areas.

Table D-20. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Closure of the Delta Cross Channel (DCC), particularly in the November through January period would increase net freshwater inflow into the western Delta from the Sacramento River, which could improve transport of Sacramento River fish to the shallow bays of the western Delta and Suisun Bay, improve habitat in those areas, and lessen their export at south-Delta pumping plants, which in turn could improve survival and population abundance of native estuarine fish.	Reactivation of flows to historical overflow basins and enhancement and restoration of aquatic and tidal wetland habitat areas could have some short-term negative effects on native estuarine fish as a result of changes in hydraulics, water quality, and habitat conditions.	To the extent consistent with CALFED objectives, design shallow-water habitat enhancements and restorations to address the habitat needs of native estuarine fish and avoid providing optimal conditions for non-native species.
Improved operation of the barrier at the head of Old River could reduce the losses of native estuarine fish moving from the Bay and western Delta toward the eastern Delta and lower San Joaquin River channel to export pumps in the south Delta and would improve water quality in the eastern Delta including the San Joaquin River channel near Stockton, which may improve native estuarine fish survival and population abundance in that portion of the Delta.	Filling Delta channels to create channel islands could result in the loss of small amounts of shallow-water habitat.	To the extent consistent with CALFED objectives, develop and implement methods that minimize potential adverse effects of changes to hydraulics, water quality, and habitat on estuarine fish species when restoring tidal wetlands from subsided leveed lands.
Improving and restoring Yolo Bypass channels and Bypass draining could reduce stranding losses of native estuarine fish in the Bypass and provide added spawning and rearing habitat, and improve foodweb productivity in the Bypass and Delta, which could increase survival and population abundance.	Temporary and localized increases in turbidity could result from construction required to implement habitat restoration or other CALFED actions.	To the extent consistent with CALFED objectives, construct channel islands in sloughs that have relatively poor shallow-water and shaded riverine aquatic (SRA) habitats such that the net gain in these habitats is positive.

Table D-20. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Protection, enhancement, and restoration of riparian habitat along channels and channel islands would increase SRA habitat and shallow-water edge habitat, which could provide more spawning and rearing habitat, as well as improve foodweb productivity, which would increase survival and population abundance of native estuarine fish.	An increase in agricultural water diversions in the Delta during winter to create shallow flooded habitats could reduce net downstream transport of some estuarine larvae and juveniles through the Delta, which could reduce juvenile production and adult populations of native estuarine fish.	To the extent practicable, confine additional pumping to times and area to channels with minimal concentrations of fish.
Re-establishment of hydrologic connectivity to historical overflow basins may provide additional spawning and rearing habitat in flood years that could increase reproduction, survival, and population levels native estuarine fish.	Consolidated larger and fewer diversions and positive-barrier bypass-screen systems could increase entrainment, impingement, and predation losses of native estuarine fishes and therefore decrease survival and population abundance.	Install screens on new diversions to avoid entrainment of juvenile and adult estuarine fish.
Avoiding dredging at important times and places in the Delta would help improve native estuarine fish feeding habitats and potentially lead to improved populations.	Upgrading levees could degrade existing riparian, wetland, and SRA habitats along existing levees and potentially reduce survival, thereby decreasing production and population levels of native estuarine fish.	To the extent consistent with CALFED objectives, confine additional winter diversions necessary to manage restored seasonal habitats to non-dry years when water supplies are sufficient to minimize any effects on downstream transport, export pumping ratios, and foodweb productivity.
Limiting abundance of non-native aquatic species may reduce competition and predation, and thus increase survival and population abundance of native estuarine fish.	Reducing the total loadings of organic material in the aquatic environment could reduce foodweb productivity, which could reduce production and population abundance of native estuarine fish.	To the extent consistent with CALFED objectives, place consolidated intakes in areas that support minimal numbers of native estuarine fish, particularly delta smelt.
Consolidating diversions and upgrading fish screens and handling systems could reduce entrainment losses and lead to an increase in survival and population levels of native estuarine fish.	Further development of water transfers could lead to a shift in Delta water diversions to periods with a higher risk of losses caused by entrainment.	Design and construct a new fish-screen system at the entrance to Clifton Court Forebay to alleviate the loss of native estuarine fish to predation in the forebay and to the existing fish-bypass and collection facility within the forebay.

Table D-20. Continued

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Reduction in the loss of juvenile and adult fish to illegal net fishing and legal sport fishing in the Delta could increase the population levels of native estuarine fish.	Alteration of conveyance features at south-Delta pumping plants could increase the pumping capacity, which could lead to increasing entrainment and salvage losses of native estuarine fish at the intake facilities.	Screen intakes or connect intakes of the Tracy Pumping Plant (Central Valley Project) to the screened Clifton Court Forebay to alleviate loss of native estuarine fish at the Tracy Fish Protection Facility.
Reduction in the levels of contaminants being released into Delta channels could increase foodweb productivity and improve survival, leading to increased production and higher population levels of native estuarine fish.	The discharge of Sacramento River water into the interior Delta via Snodgrass Slough could result in some estuarine fishes (e.g., splittail) being drawn up to the discharge point during annual spawning migrations up the Sacramento River.	Screen all Delta diversions that may entrain native estuarine fish.
Proposed habitat improvements along upgraded levees (e.g., shallow slopes and vegetated berms) could improve rearing habitat and potentially increase production and population levels of native estuarine fish.	Diversion of Sacramento River water into Snodgrass Slough could lead to entrainment and salvage losses of estuarine fish diverted from the Sacramento River.	Restore or enhance 1–3 times the amount of nearshore habitat affected by levee upgrades near where impacts are incurred.
Increased freshwater inflow to Delta and Bay and reductions in exports and export-related losses of native estuarine fish through water conservation if saved water is used to augment freshwater inflow to the Delta.	Diversion of Sacramento River water into Snodgrass Slough without screening could result in greater numbers of native estuarine fish from the Sacramento River being drawn into the interior Delta where they may have poorer habitat and greater chance of being entrained or salvaged at south-Delta pumping plants.	Include project design features that allow for onsite reestablishment and long-term maintenance of aquatic, wetland, and riparian habitat following project construction.
Further development of water transfers could lead to reductions in exports at high-risk times of the year, which could reduce losses of native estuarine fish at project pumping plants or adverse habitat changes caused by water diversions.	The increase in flushing rate of the interior northern portion of the central Delta could alter foodweb productivity and tidal freshwater habitat conditions that could, in turn, limit production of native estuarine fishes in the area.	Increased natural organic inputs, such as from restored tidal wetlands and riparian habitats, could replace reductions in unnatural inputs of organic carbon.

Potential Beneficial Effects	Potential Adverse Effects	Conservation Measures Incorporated into CALFED to Avoid, Minimize, and Compensate for Adverse Effects
Alteration of channels in the south Delta could improve habitat in altered and other channels, which could lead to greater foodweb productivity, improved spawning and rearing habitat, and reduced entrainment and salvage losses of native estuarine fish at south-Delta pumping plants.	An isolated conveyance facility could increase entrainment losses of native estuarine fish in the north Delta at Central Valley Project (CVP) and State Water Project (SWP) diversions. Larval fish in the Sacramento River near the proposed intake would be more vulnerable to entrainment. Juvenile and adult fish would be vulnerable to handling effects at intake screens.	Water transfers should be conducted in a manner that avoids increased exports during periods when estuarine fish are more vulnerable to damage or loss at project facilities.
Improvements to CVP and SWP conveyance features at south-Delta pumping plants (e.g., Joint Point of Diversion) could reduce vulnerability of native estuarine fish to entrainment and salvage losses at facility intakes.		Construction and operation of new conveyance features to the south-Delta pumping plants should be designed to minimize losses of estuarine fish.
An isolated conveyance facility could improve spawning, rearing, and feeding habitat, improve foodweb productivity, reduce losses to water diversions, and improve transport of juvenile native estuarine fish to optimum rearing areas in the Delta and Bay.		Design and operate proposed new diversions from the Sacramento River to minimize adverse effects on migrating native estuarine fishes, to avoid blocking upstream migration of fish to the Sacramento River, and to improve habitat conditions for native estuarine fish.
Improved sediment supplies and improve riverine aquatic habitat conditions could improve floodplain spawning and rearing habitats for some estuarine species (e.g., Sacramento splittail), which could improve species survival and abundance.		
Improvements to passage routes in floodplains for the Sacramento splittail could increase access to spawning and rearing areas.		